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INTERFACE CONTROL DOCUMENT

FOR THE

HORIZONTAL TECHNOLOGY INTEGRATION PROGRAM

M1A2 SECOND GENERATION THERMAL IMAGING SYSTEM

APPROVAL:
ERR:

CAMILLE M. NICHOLS
LTC, EN
PRODUCT MANAGER, SECOND GENERATION
FORWARD LOOKING INFRARED
DATE: 6 Jul 99

ROBERT L. GROLLER
LTC, AR
PRODUCT MANAGER, M1A2
ABRAMS TANK SYSTEM
DATE: 28 JUNE 99

TABLE OF CONTENTS

1.0 SCOPE 4

1.1 Purpose 4

1.2 ICD Change Control 4

2.0 APPLICABLE DOCUMENTS 5

2.1 Order of Precedence 5

3.0 INTERFACE REQUIREMENTS 6

3.1 Second Generation Thermal Receiver Unit (SGTRU) 6
3.1.1 Mechanical Interface 6
3.1.2 Optical Interface 7
3.1.3 Electrical Connections and Signal Types 7
3.1.4 Thermal 8

3.2 Second Generation Common Electronics Unit (SGCEU) 8
3.2.1 Mechanical Interface 8
3.2.2 Electrical Connections and Signal Types 9
3.2.3 Thermal 10
3.2.4 Test Interface 10

3.3 Second Generation Biocular Image Control Unit (SGBICU) 10
3.3.1 Mechanical Interface 10
3.3.2 Optical Interface 11
3.3.3 Electrical Connections and Signal Types 11
3.3.4 Thermal 12

4.0 M1A2/SECOND GENERATION THERMAL IMAGING SYSTEM A-KIT INTERFACE 13

4.1 Mechanical Interface 13
4.1.1 Electrical Connectors 13

4.2 Optical Interface 13

4.3 Vehicle Cable Shielding 14

4.4 Electrical Connections and Signal Types 14
4.4.1 Interconnecting Cables 14
4.4.2 Power 14

4.5 Signal List 15

LIST OF FIGURES

APPENDIX I

Figure 1: M1A2 SGTIS Block Diagram 17
Figure 2: SGTRU Mechanical Interface 18
Figure 3: M1A2 SGTIS Interconnecting Cables 23
Figure 4: SGBICU Mechanical Interface 24
Figure 5: M1A2 TIS Cable Interlock Diagram 30
Figure 6: BICU Test Connector Waveforms 31

LIST OF TABLES

APPENDIX II

Table I: SGTRU Electrical Connections and Signal Types 34
Table II: SGCEU Electrical Connections and Signal Types 42
Table III: SGBICU Electrical Connections and Signal Types 59

1.0 SCOPE

This document defines the mechanical, optical, electrical, thermal and test interfaces for the Horizontal Technology Integration (HTI) M1A2 Second Generation Thermal Imaging System (SGTIS). It is an iterative document, written with the purpose of furnishing data to allow the definition of interfaces for the M1A2 SGTIS.

1.1 Purpose

This document shall define and provide the means to control the interfaces between the Abrams (M1A2) Tank and the GEN II FLIR Thermal Imaging System (SGTIS). This document is an iterative document for the purpose of allowing new interfaces to be established and existing interfaces to change. Coordination control of the interfaces is provided by requiring the program participants affected by the interface to approve the new interface definition or existing interface definition change before it becomes a part of this document.

This document is invoked on all contractors to control interfaces between various subsystems of the M1A2 SGTIS. Conformance of these subsystems to approved interface requirements is mandatory and must be indicated in all supporting contractual and technical documentation.

Additionally, this document provides any new engineering data (peculiar to the identification and definition of any interface) required for the integration of the M1A2 SGTIS into existing or new systems. Specific details pertaining to M1A2 SGTIS performance requirements can be obtained from referenced documentation/specifications.

1.2 ICD Change Control

Coordination control of the interfaces is provided by requiring the program participants affected by the interface to approve the new interface definition or existing interface definition change before it becomes a part of this document. The interfaces defined and controlled herein shall be changed only upon mutual technical approval of a proposed interface change request resulting in the issuance of an approved Interface Revision Notice (IRN). Requests to define a new interface or change an existing interface may be initiated by any program participant and will be subject to the Change Control System.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this ICD to the extent specified herein. In the event of conflict between the document referenced herein and the contents of this ICD, the contents of this ICD shall be considered a superseding requirement.

Drawings

12282384	M1A2 SGTIS Optical Interface
12987790	Second Generation Thermal Receiver Unit
A3248300	Second Generation Common Electronics Unit
12987770	Second Generation Biocular Image Control Unit

Other Documents

MIL-PRF-12978006	Performance Specification - M1A2 Second Generation Thermal Receiver Unit
MIL-PRF-12978041	Performance Specification - M1A2 Second Generation Biocular Image Control Unit
MIL-PRF-A3207380	Performance Specification for Horizontal Technology Integration, NV-80 B-Kit
80063-A3271784	Interface Control Document for the HTI Program NV-80 B-Kit
EIA RS-170	Electrical Performance Standards, Monochrome Television Studio Facilities
EIA RS-422	Electrical Characteristics of Balanced Voltage Digital Interface Circuits
MIL-C-38999	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for
MS3114	Connectors, Receptacle, Electrical, Series 1, Solder Type, Jam Nut Mounting, Bayonet Coupling, Classes E, F, H, and P.

2.1 Order of Precedence

In the event of a conflict between the text of this specification and the references cited herein, the text of the Performance Specification for Horizontal Technology Integration NV-80 B-Kit, MIL-PRF-A3207380, takes precedence, followed by the text of this document. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3.0 INTERFACE REQUIREMENTS

The M1A2 SGTIS consists of three Line Replaceable Units (LRU): the Second Generation Thermal Receiver Unit (SGTRU), the Second Generation Common Electronics Unit (SGCEU), and the Second Generation Biocular Image Control Unit (SGBICU). An overall block diagram of the M1A2 SGTIS A-Kit is provided in Appendix I, Figure 1. M1A2 SGTIS mechanical, optical, electrical, thermal and test interfaces are defined in the following paragraphs.

3.1 Second Generation Thermal Receiver Unit (SGTRU)

Second Generation Thermal Receiver Unit (SGTRU) interface requirements are as follows.

3.1.1 Mechanical Interface

Mechanical interface details for the SGTRU are specified in Appendix I, Figure 2. Also identified are any critical tolerances and/or dimensions that must be closely adhered to. SGTRU subassemblies are to be interchangeable to the extent that no modifications to the sight or LRU are required to facilitate subassembly installation.

3.1.1.1 Space Claim

Physical dimensions of the SGTRU are specified in Appendix I, Figure 2.

3.1.1.1.1 Mounting

SGTRU mounting provisions are specified in Appendix I, Figure 2. Also identified are any critical tolerances and/or dimensions that must be closely adhered to.

3.1.1.1.2 Electrical Connectors

Connectors and their mates are keyed such that no two connectors on the same LRU are identical. Electrical connectors, for interconnection of the SGTRU with other assemblies, are specified below:

Interface	Connector Reference Designation	Vendor Part Number	Compatible Mate Part Number
Signal	J1	H920166 - 003C*	D38999/26NG35SA
Signal/Power	J2	H920166 - 002C*	D38999/26NH35SA

* Note: Hughes CAGEC is 3U331

3.1.1.1.2.1 Connector Types

Connector types are screw lock and Mil Spec (MIL-C-38999 series 3) approved. Both connectors are custom due to lack of the machining in the connector shell for the rear accessory skirt. Connectors and their mates are keyed such that no two connectors on the same LRU are identical.

3.1.1.1.2.2 Connector Locations

Connector locations, for electrical cables to interconnect the SGTRU to other assemblies of the M1A2 SGTIS, are shown in Appendix I, Figure 2.

3.1.1.1.3 Weight and Center of Gravity

Weight of the SGTRU is less than 43 pounds. SGTRU center of gravity is located in Appendix I, Figure 2.

3.1.2 Optical Interface

SGTRU optical interface characteristics are in accordance with Drawing 12282384.

3.1.3 Electrical Connections and Signal Types

The SGTRU is connected electrically with the SGCEU and SGBICU. SGTRU connector pin assignments and signal characteristics are in accordance with Appendix II, Table I.

3.1.3.1 Interconnecting Cables

Electrical cabling, for interconnection of the SGTRU to other assemblies of the M1A2 SGTIS, is in accordance with Appendix I, Figure 3.

3.1.3.1.1 Controls and Indicators

SGTRU control and indicator requirements are specified in MIL-PRF-12978006, the Performance Specification for Horizontal Technology Integration Program, M1A2 Second Generation Thermal Imaging System Thermal Receiver Unit.

3.1.3.1.2 Power

The SGTRU receives its primary power (+28 Vdc) and secondary power (various voltage forms) from the SGCEU. Power requirements are specified in Appendix II, Table I.

3.1.3.1.3 Grounding

The prime power return and the chassis ground shall be isolated from each other so that the direct current resistance between them is not less than 166 Kohms at 50VDC. SGTRU grounding location is specified in Appendix I, Figure 2d.

3.1.3.1.4 Signal Returns

Signal returns (referenced to secondary power return) shall be isolated from the prime power return by a minimum of 166 Kohms.

3.1.3.2 Signal List

The SGTRU signal list is provided in Appendix II, Table I.

3.1.4 Thermal

Thermal interfaces for the SGTRU are in accordance with stated environmental conditions per MIL-PRF-12978006, the Performance Specification for Horizontal Technology Integration Program, M1A2 Second Generation Thermal Imaging System Thermal Receiver Unit.

The air flow must not be blocked for proper cooling. A minimum of 0.75 inch clearance must be provided to the designed air flow inlet and outlets as per the NV-80 B-Kit ICD 80063-A3271784. Mechanical interfaces between the SGTRU and M1A2 and its' components shall not be relied upon as thermal paths.

3.1.4.1 Operating Temperatures

Acceptable SGTRU operating temperatures may range from -46°C to +71°C.

3.1.4.2 Storage Temperatures

Acceptable SGTRU storage tempertures may range from -51°C to +71°C.

3.1.4.3 Power Dissipation

Power dissipated from the SGTRU shall not exceed 120 DC watts.

3.2 Second Generation Common Electronics Unit (SGCEU)

Second Generation Common Electronics Unit (SGCEU) interface requirements are as follows:

3.2.1 Mechanical Interface

Mechanical interface details for the SGCEU are specified in the NV-80 B-Kit ICD 80063-A3271784. Also identified are any critical tolerances and/or dimensions that must be closely adhered to.

SGCEU subassemblies are to be interchangeable to the extent that no modifications to the vehicle or LRU are required to facilitate subassembly installation.

3.2.1.1 Space Claim

Physical dimensions of the SGCEU are specified in the NV-80 B-Kit ICD 80063-A3271784.

3.2.1.1.1 Mounting

SGCEU mounting provisions are specified in the NV-80 B-Kit ICD 80063-A3271784. Also identified are any critical tolerances and/or dimensions that must be closely adhered to.

3.2.1.1.2 Electrical Connectors

Connectors and their mates are keyed such that no two connectors on the same LRU are identical. Electrical connectors, for interconnection of the SGCEU with other assemblies, are specified in the NV-80 B-Kit ICD 80063-A3271784.

3.2.1.1.2.1 Connector Types

Connector types are screw lock and Mil Spec (MIL-C-38999 series 3) approved per the NV-80 B-Kit ICD 80063-A3271784. The connectors, excluding J4, are custom due to lack of the machining in the connector shell for the rear accessory skirt. Connectors and their mates are keyed such that no two connectors on the same LRU are identical.

3.2.1.1.2.2 Connector Locations

Connector locations, for electrical cables to interconnect the SGCEU to other assemblies of the M1A2 SGTIS, are shown in the NV-80 B-Kit ICD 80063-A3271784.

3.2.1.1.3 Weight and Center of Gravity

Weight of the SGCEU is specified in the NV-80 B-Kit ICD 80063-A3271784. SGCEU center of gravity is located in the NV-80 B-Kit ICD 80063-A3271784.

3.2.2 Electrical Connections and Signal Types

The SGCEU is connected electrically with the vehicle, SGTRU and SGBICU. SGCEU connector pin assignments and signal characteristics are in accordance with Appendix II, Table II.

3.2.2.1 Interconnecting Cables

Electrical cabling, for interconnection of the SGCEU to other assemblies of the M1A2 SGTIS, is in accordance with Appendix I, Figure 3.

3.2.2.1.1 Power

The SGCEU receives its primary power from the vehicle. Power requirements are specified in Appendix II, Table II.

3.2.2.1.2 Grounding

The prime power return and the chassis ground shall be isolated from each other so that the direct current resistance between them shall be not less than 166 Kohm at 50VDC. SGCEU grounding location is specified in the NV-80 B-Kit ICD 80063-A3271784.

3.2.2.1.3 Signal Returns

Signal returns shall be isolated from the prime power return by a minimum of 166kOhms.

3.2.2.2 Signal List

The SGCEU signal list is provided in Appendix II, Table II.

3.2.3 Thermal

Thermal interfaces for the SGCEU are in accordance with the NV-80 B-Kit ICD 80063-A3271784.

The air flow must not be blocked for proper cooling. A minimum of 0.75 inch clearance must be provided to the designed air flow inlet and outlets as per the NV-80 B-Kit ICD 80063-A3271784. Mechanical interfaces between the SGCEU and M1A2 and its' components shall not be relied upon as thermal paths.

3.2.3.1 Operating Temperatures

Acceptable SGCEU operating temperatures may range from -46°C to +71°C.

3.2.3.2 Storage Temperatures

Acceptable SGCEU storage tempertures may range from -51°C to +71°C.

3.2.3.3 Power Dissipation

Power dissipated in the SGCEU shall not exceed 125 DC Watts (without the spare card slot populated).

3.2.4 Test Interface

Test interface/capabilities for the SGCEU is via connector J1 as specified in Appendix II, Table II. As shown in Figure 5, this connector is unused. A suitable environmental cap for the J1 connector should be affixed to the hardware using appropriate platform mounting provisions.

3.3 Second Generation Biocular Image Control Unit (SGBICU)

Second Generation Biocular Image Control Unit (SGBICU) interface requirements are as follows:

3.3.1 Mechanical Interface

Mechanical interface details for the SGBICU are specified in Appendix I, Figure 4. Also identified are any critical tolerances and/or dimensions that must be closely adhered to.

SGBICU subassemblies are to be interchangeable to the extent that no modifications to the sight or LRU are required to facilitate subassembly installation.

3.3.1.1 Space Claim

Physical dimensions of the SGBICU are specified in Appendix I, Figure 4.

3.3.1.1.1 Mounting

SGBICU mounting provisions are specified in Appendix I, Figure 4. Also identified are any critical tolerances and/or dimensions that must be closely adhered to.

3.3.1.1.2 Electrical Connectors

Connectors and their mates are keyed such that no two connectors on the same LRU are identical. Electrical connectors, for interconnection of the SGBICU with other assemblies, are specified below:

Interface	Connector Reference Designation	Part Number	Compatible Mate Part Number
Signal/Power	J1	D38999/23NG35PN	D38999/26NG35SN
Test	J2	MS3114H20A41PN (or Equiv)	-

3.3.1.1.2.1 Connector Types

Connector J1 is screw lock and Mil Spec (MIL-C-38999 series 3) approved. Connector J2 is screw lock and Mil Spec (MS 3114) approved. Connectors and their mates are keyed such that no two connectors on the same LRU are identical.

3.3.1.1.2.2 Connector Locations

Connector locations, for electrical cables to interconnect the SGBICU to other assemblies of the M1A2 SGTIS, are shown in Appendix I, Figure 4.

3.3.1.1.3 Weight and Center of Gravity

Weight of the SGBICU is less than 28 pounds. SGBICU center of gravity is located in Appendix I, Figure 4

3.3.2 Optical Interface

SGBICU optical interface characteristics are in accordance with MIL-PRF-12978041, the Performance Specification - M1A2 Second Generation Biocular Image Control Unit.

3.3.3 Electrical Connections and Signal Types

The SGBICU is connected electrically with the SGCEU and SGTRU. SGBICU connector pin assignments and signal characteristics are in accordance with Appendix II, Table III. The SGBICU monitors the cable disconnect/interlock loop.

3.3.3.1 Interconnecting Cables

Electrical cabling, for interconnection of the SGBICU to other assemblies of the M1A2 SGTIS, is in accordance with Appendix I, Figure 3.

3.3.3.1.1 Controls and Indicators

SGBICU control and indicator requirements are specified in MIL-PRF-12978041, the Performance Specification - M1A2 Second Generation Biocular Image Control Unit.

3.3.3.1.2 Power

The SGBICU receives various power forms from the SGCEU. Power requirements are specified in Appendix II, Table III.

3.3.3.1.3 Grounding

The power returns and the chassis ground shall be isolated from each other so that the direct current resistance between them shall be not less than 200 Kohm at 50VDC. SGBICU grounding location is specified in Appendix I, Figure 4.

3.3.3.1.4 Signal Returns

Signal returns shall be isolated from the prime power return by a minimum of 200 Kohms.

3.3.3.2 Signal List

The SGBICU signal list is provided in Appendix II, Table III. A test connector is provided on the back of the SGBICU as shown in Appendix I, Figure 4. The signals on the test connector are described in Appendix II, Table III, and the waveforms for the signals are described in Appendix I, Figure 6.

3.3.4 Thermal

Thermal interfaces for the SGBICU are in accordance with stated environmental conditions per MIL-PRF-12978041, the Performance Specification - Second Generation Biocular Image Control Unit.

The area immediately surrounding the SGBICU shall be kept free and clear (0.75 inch clearance min) to allow for adequete cooling and ventilation of the assembly. The Mechanical interfaces between the SGBICU and M1A2 and its' components shall not be relied upon as thermal paths.

3.3.4.1 Operating Temperatures

Acceptable SGBICU operating temperatures may range from -46°C to +71°C.

3.3.4.2 Storage Temperatures

Acceptable SGBICU storage tempertures may range from -51°C to +71°C.

3.3.4.3 Power Dissipation

Power dissipated by the SGBICU shall not exceed 55 watts.

4.0 M1A2/Second Generation Thermal Imaging System A-Kit Interface

M1A2 to Second Generation Thermal Imaging System (SGTIS) A-Kit interface requirements are as follows:

4.1 Mechanical Interface

Mechanical interface details for the M1A2 SGTIS are specified in Appendix I, Figures 2 and 4 and in the NV-80 B-Kit ICD 80063-A3271784. Also identified are any critical tolerances and/or dimensions that must be closely adhered to.

4.1.1 Electrical Connectors

Connectors and their mates are keyed such that no two connectors on the same LRU are identical. Electrical connectors, for interconnection of the M1A2 SGTIS with other assemblies, are specified below:

Interface	Connector Reference Designation	Vendor Part Number	Compatible Mate Part Number
Signal	SGBICU J1	KJA7Y21K35PN - 875 - A66	D38999/26NG35SN
Power	SGCEU J4	H920166-008C*	D38999/26NE6SA
1553 Bus	SGCEUJ5	H920166-007C*	D38999/26NA98PA
1553 Bus	SGCEUJ6	H920166-006C*	D38999/26NA98PB

* Note: Hughes CAGEC is 3U331

4.1.1.1 Connector Types

Connector types are twist lock and Mil Spec (MS) approved. Connectors and their mates are keyed such that no two connectors on the same LRU are identical. Unused connectors should be capped.

4.1.1.2 Connector Locations

Connector locations, for electrical cables to interconnect the various assemblies of the M1A2 SGTIS, are shown in Appendix I, Figures 2 and 4 and in the NV-80 B-Kit ICD 80063-A3271784.

4.2 Optical Interface

M1A2 SGTIS monocular display output to GPS optical interface characteristics are in accordance with Drawing 12282384 and specification MIL-PRF-12978041.

4.3 Vehicle Cable Shielding

Vehicle cable shielding and filtering shall reduce wire currents at GEN II FLIR connector pins by 20 dB minimum.

4.4 Electrical Connections and Signal Types

M1A2 SGTIS connector pin assignments and signal characteristics are in accordance with Appendix II, Tables I, II & III.

4.4.1 Interconnecting Cables

Electrical cabling, for interconnection of the various assemblies of the M1A2 SGTIS, is in accordance with Appendix I, Figure 3. The CABLE INTERLOCK implementation is shown in Appendix I, Figure 5. The maximum length of the cable between SGCEU J3 and SGTRU J2 shall not exceed 17 feet. The maximum length of the cable between SGCEU J2 and SGTRU J1 shall not exceed 17 feet.

4.4.2 Power

The SGTIS receives it's primary power from the vehicle via the SGCEU, connector J4. M1A2 SGTIS typical power requirements are specified below:

CONDITION	**FAULT FREE**
Steady State Voltage	18-33 Volts
Ripple	2 V peak on DC voltage levels of 20V-33V, 50 Hz - 200 Hz
Surge	55 V, 200 ms 15 V, 500 ms (Note 1)
Spikes	+/- 250 V, 50 μs

Note 1: Power supplies will turn off and back on (soft start) within 2 seconds after a surge event below 18 volts and having an energy of more than 15 mJ.

The maximum steady state power required from the vehicle and the dissipation for each of the three units are specified below:

	POWER (WATTS)
SGTRU	120
SGCEU	125
SGBICU	55
SGTIS (Total)	300

The maximum surge current required from the vehicle for periods of several seconds is 17.0 amps, with current spikes of 35 amps maximum for periods as long as 20 msec. The maximum turn-on in rush current is 72 amps for 8 msec 1/2 pulse width.

4.5 Signal List

The M1A2 SGTIS signal list is provided in Appendix II, Tables I, II & III . Note that associated wires/signals are grouped together and that the associated shield if any should enclose all wires within that group.

APPENDIX I

FIGURES

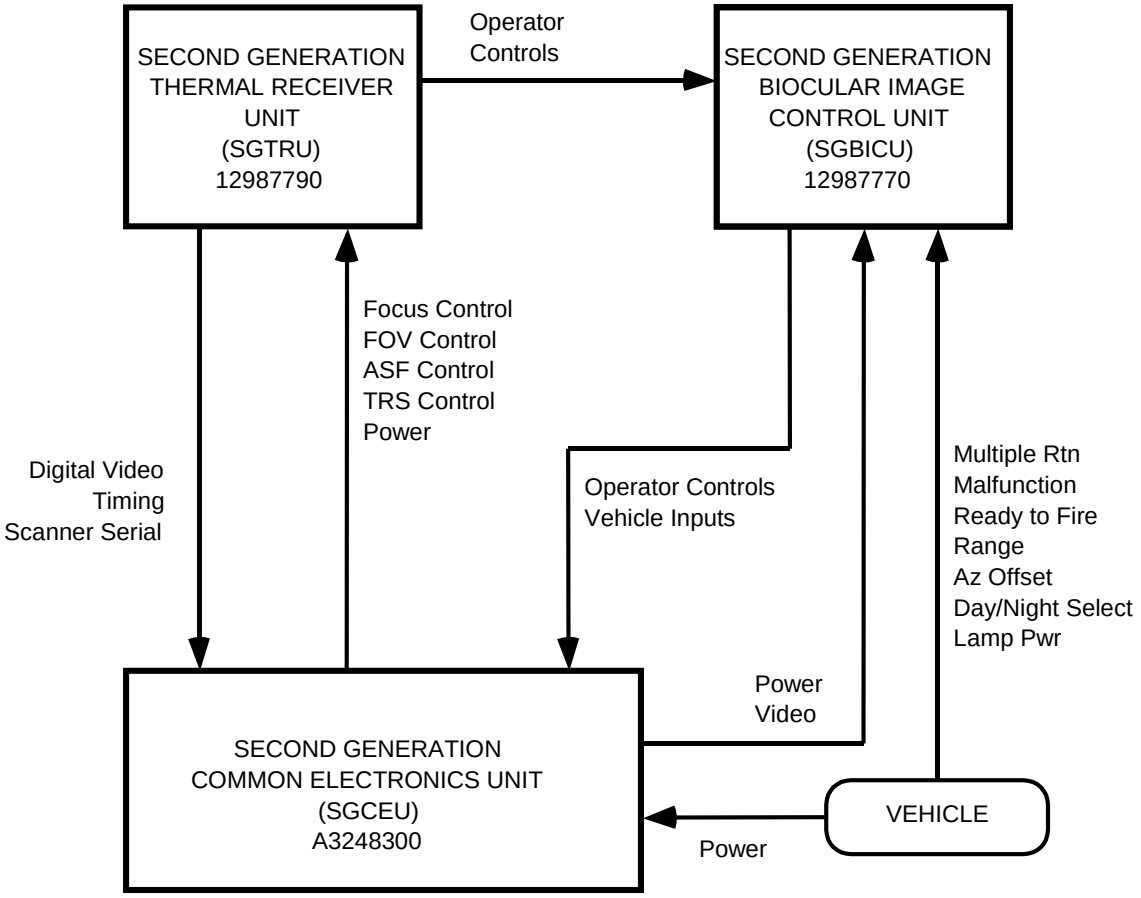
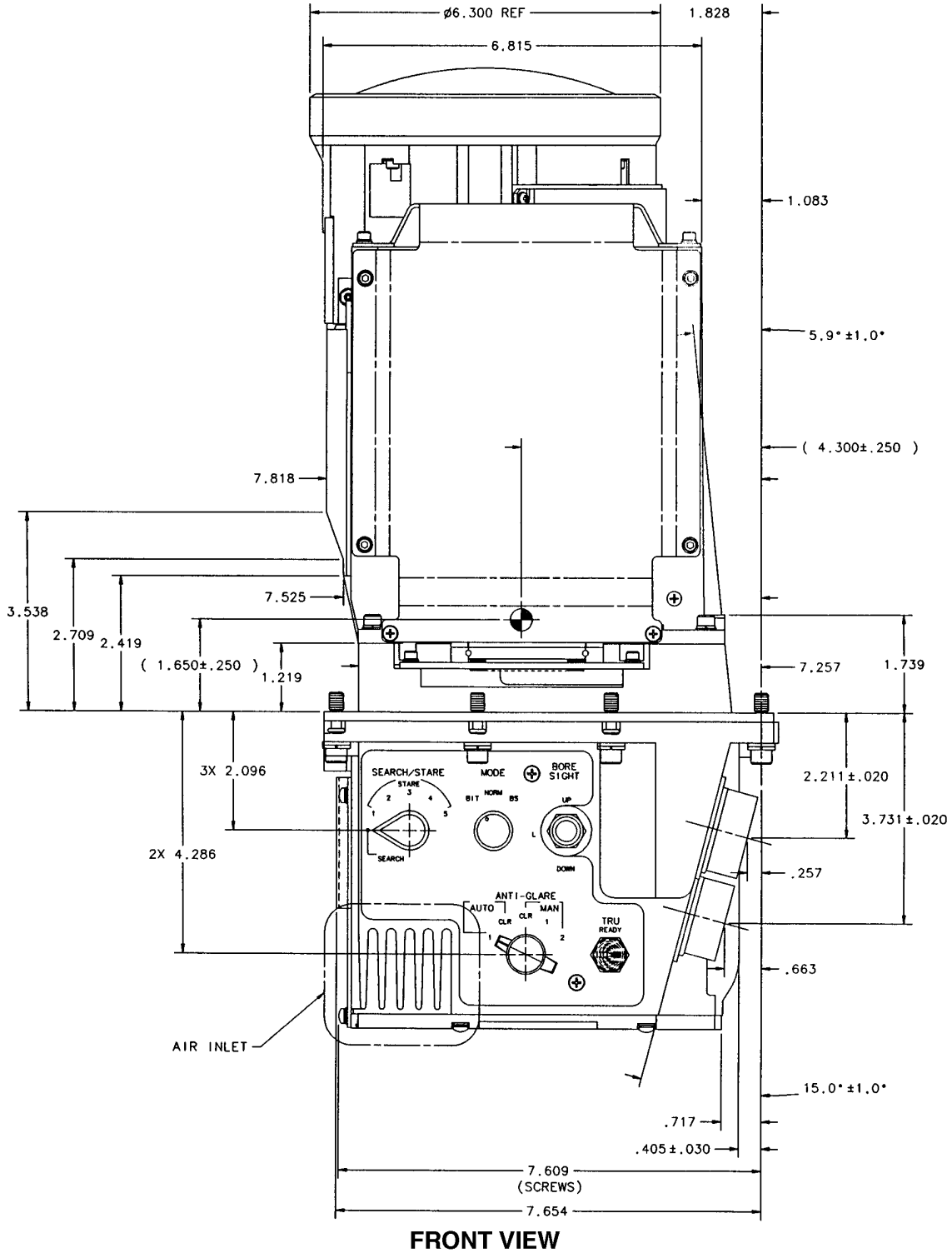


Figure 1: M1A2 SGTIS Block Diagram



FRONT VIEW

Figure 2a. SGTRU Mechanical Interface

NOTE: For Detail of the Left Side of the Mounting Flange above the Seal Plate, see Figure 2e.

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

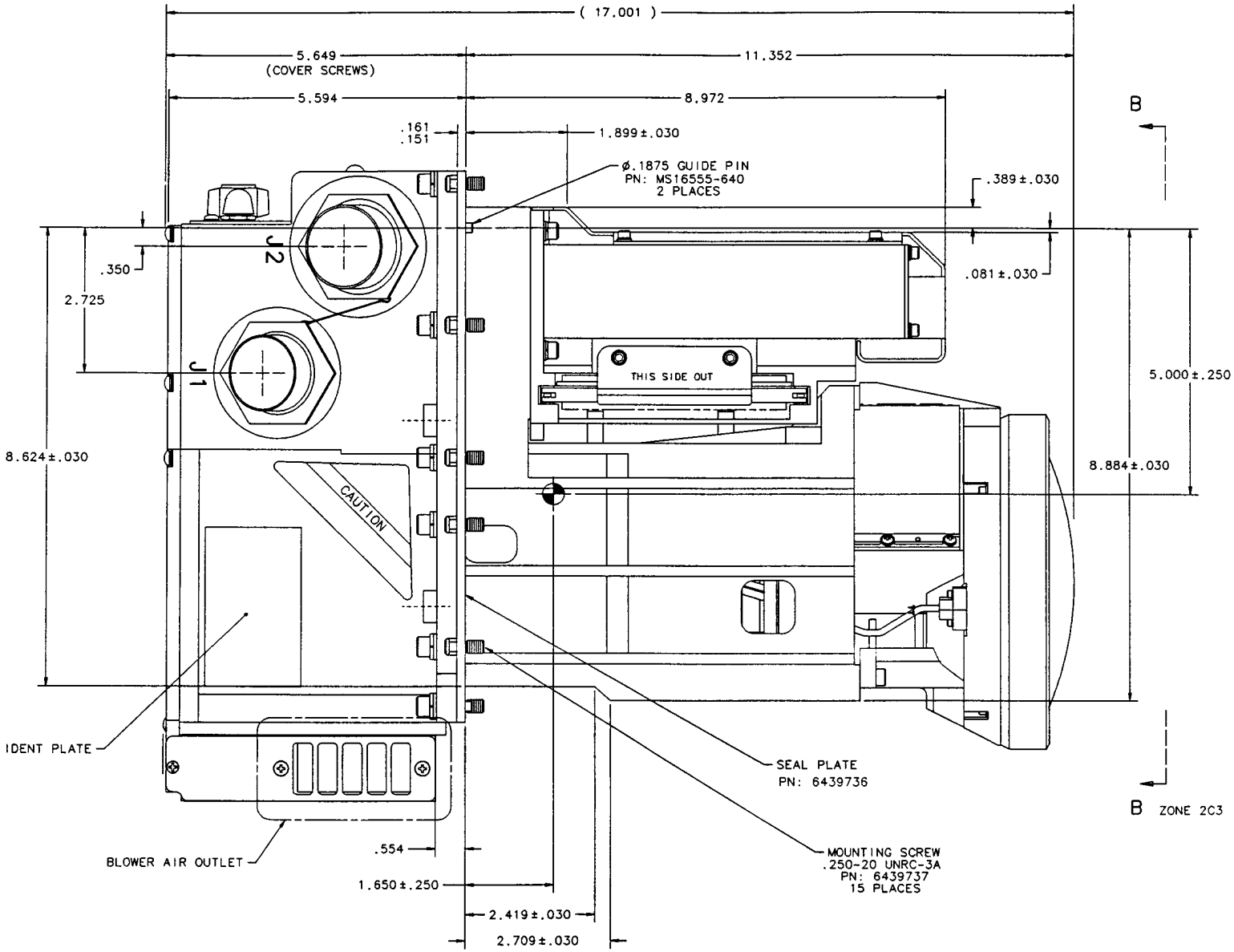


Figure 2b. SGTRU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

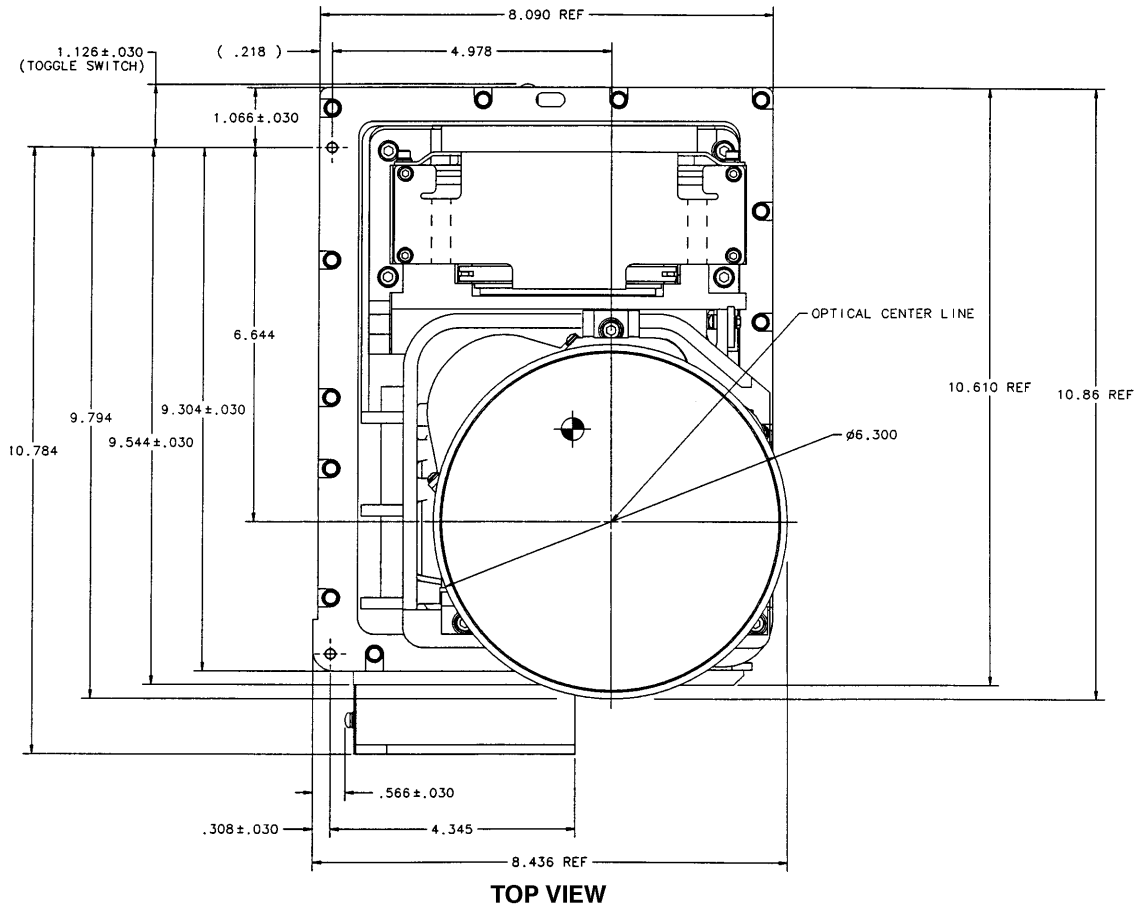


Figure 2c. SGTRU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

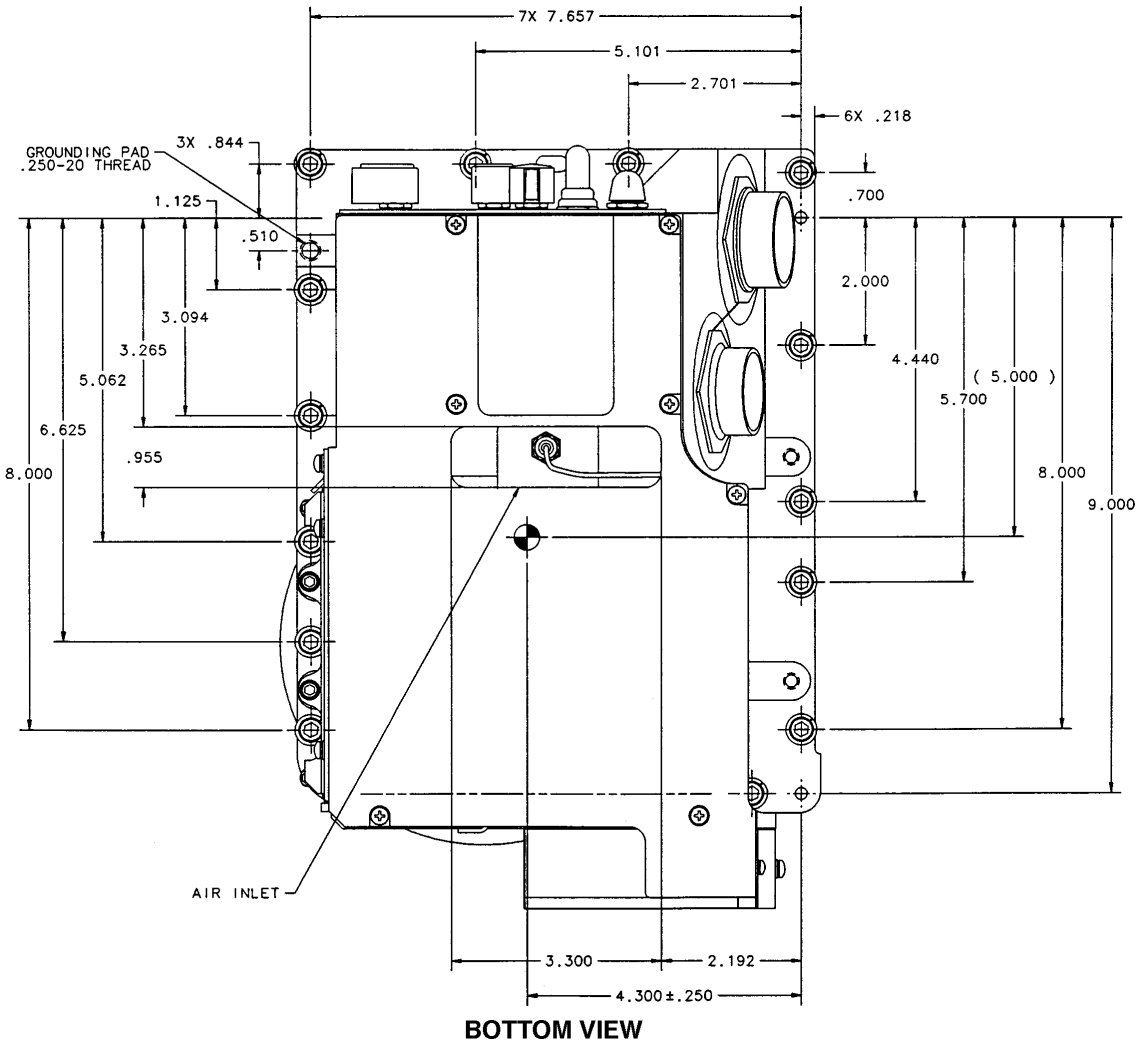


Figure 2d. SGTRU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

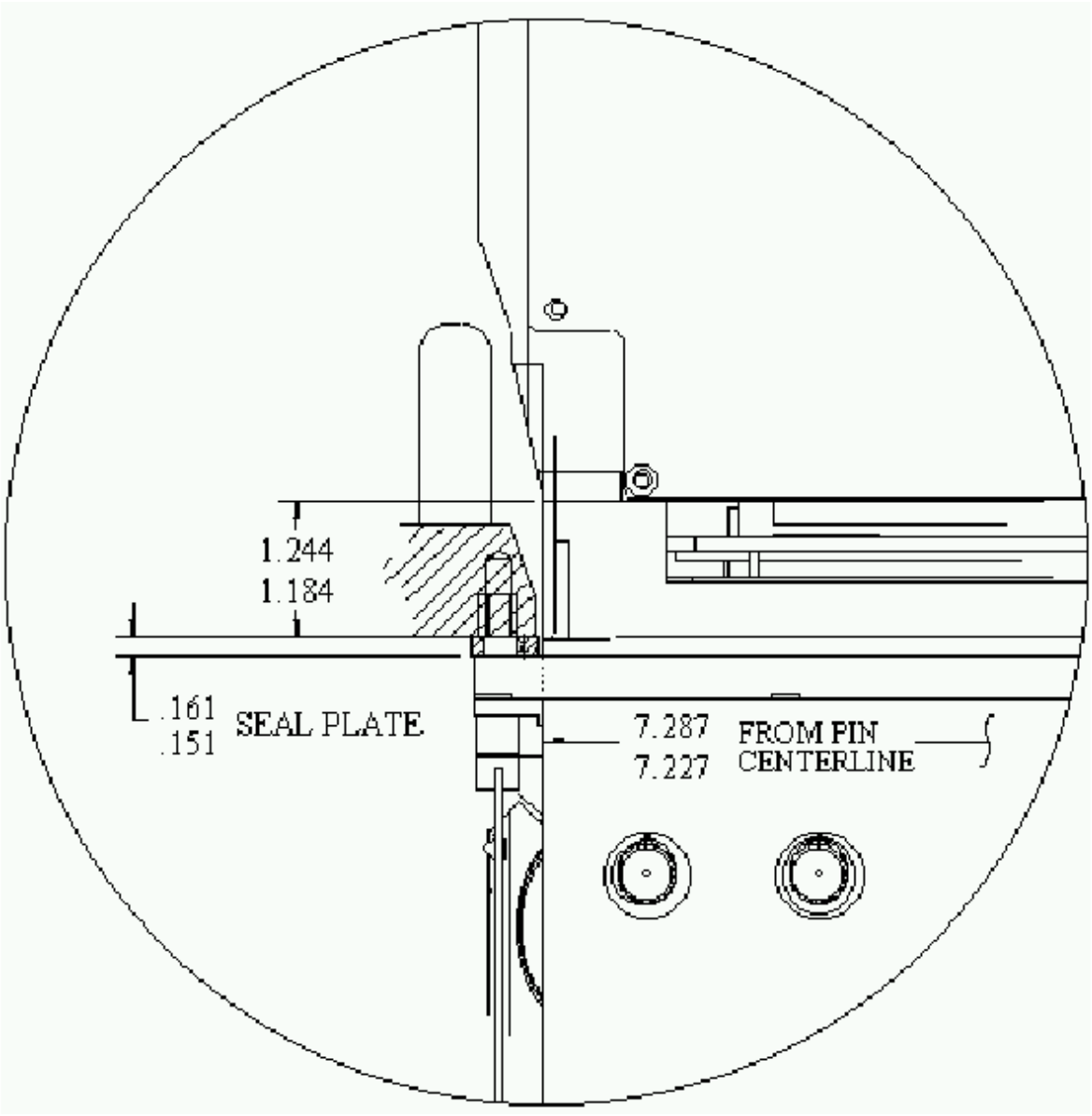


Figure 2e. SGTRU Mechanical Interface

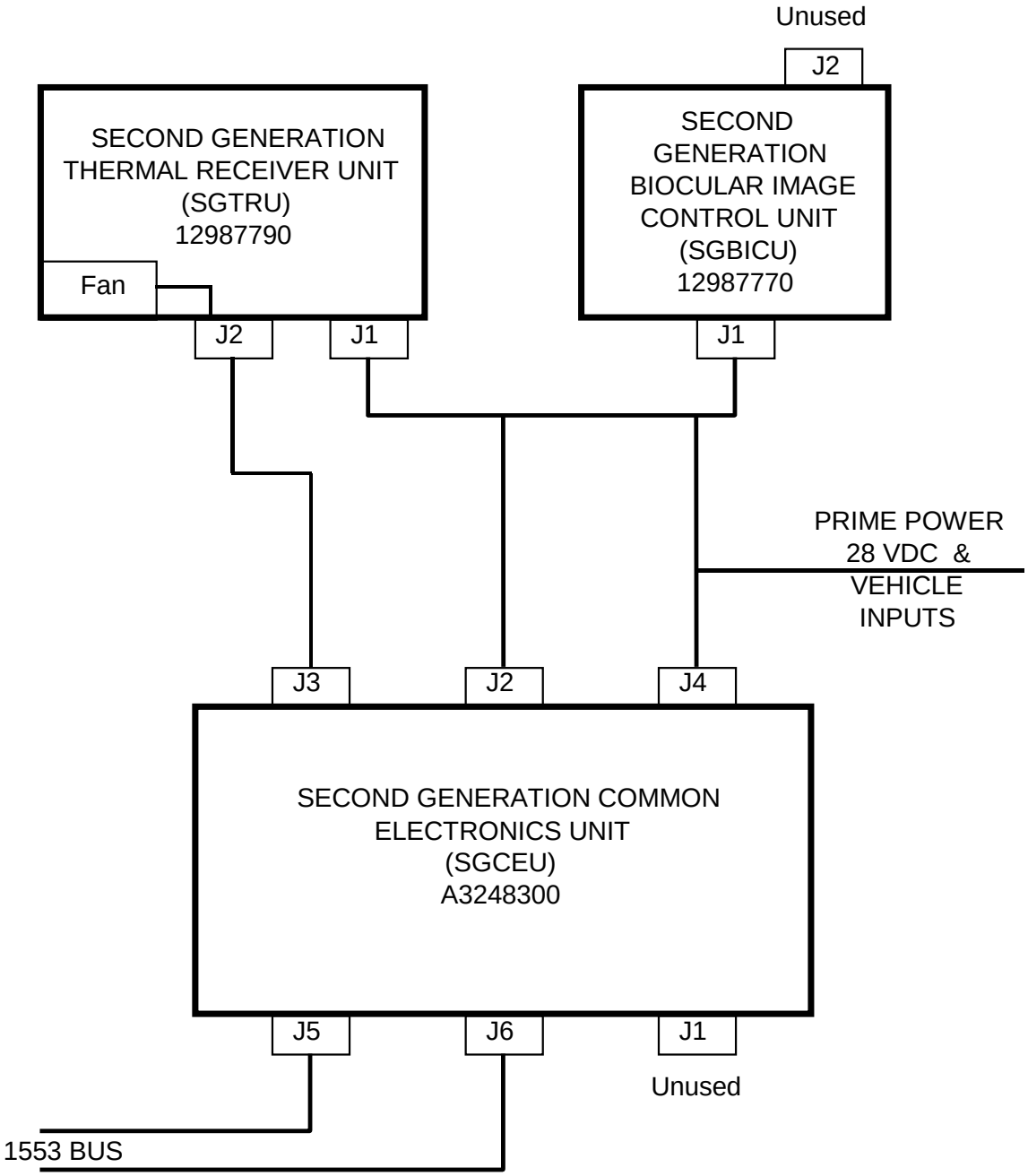


Figure 3: M1A2 SGTIS Interconnecting Cables

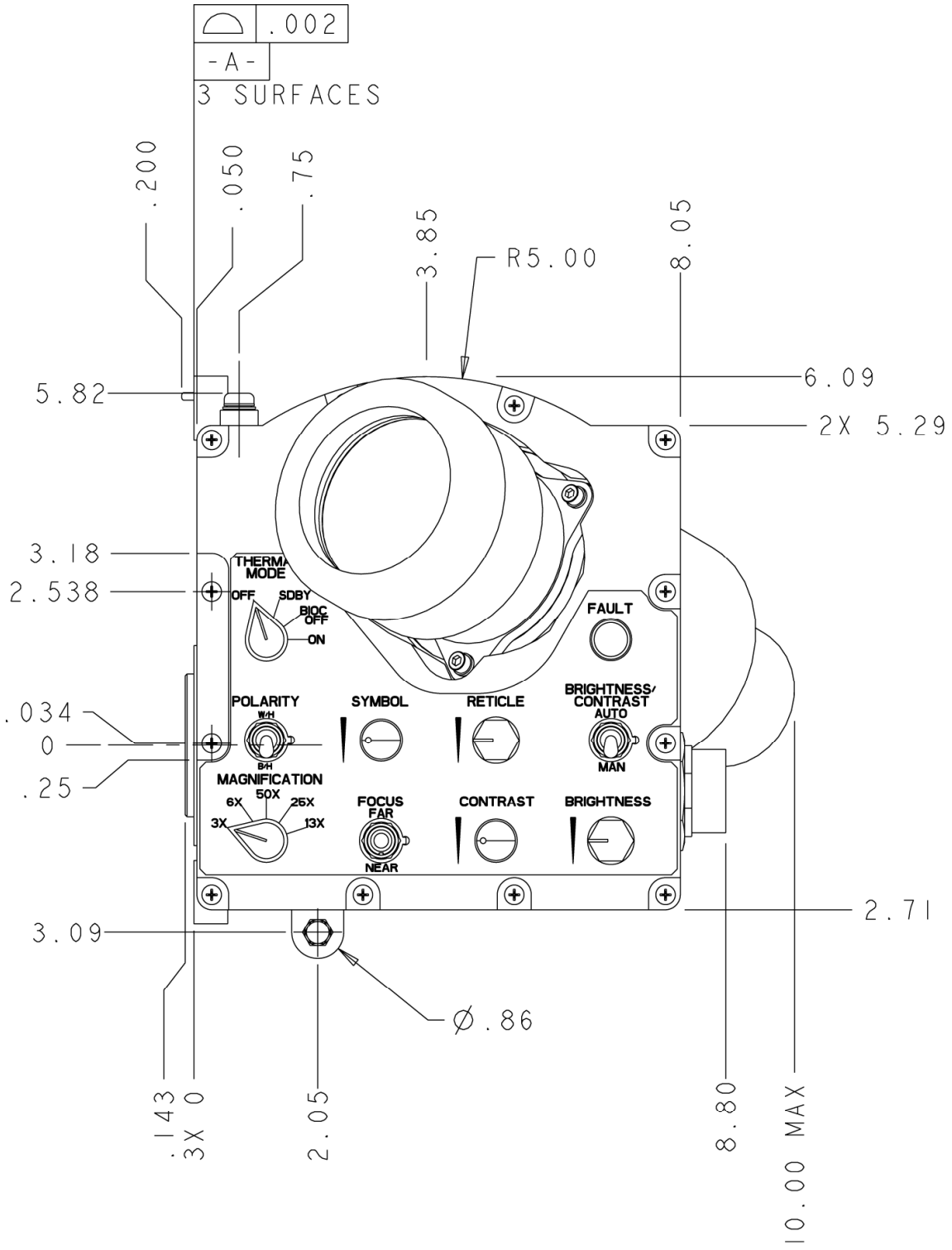


Figure 4a. SGBICU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

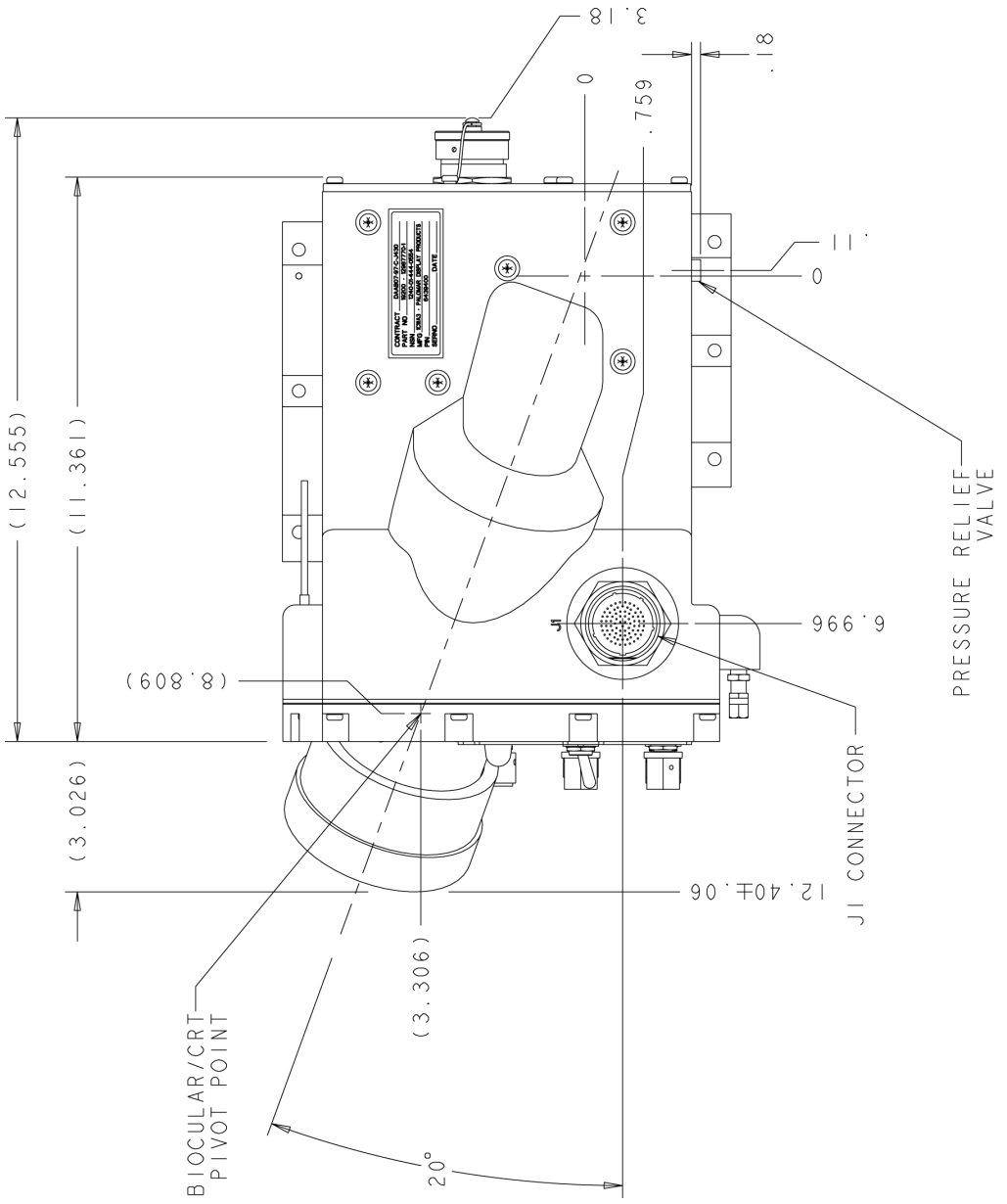


Figure 4b. SGBICU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010, ANGLES ± 0.5° unless otherwise specified

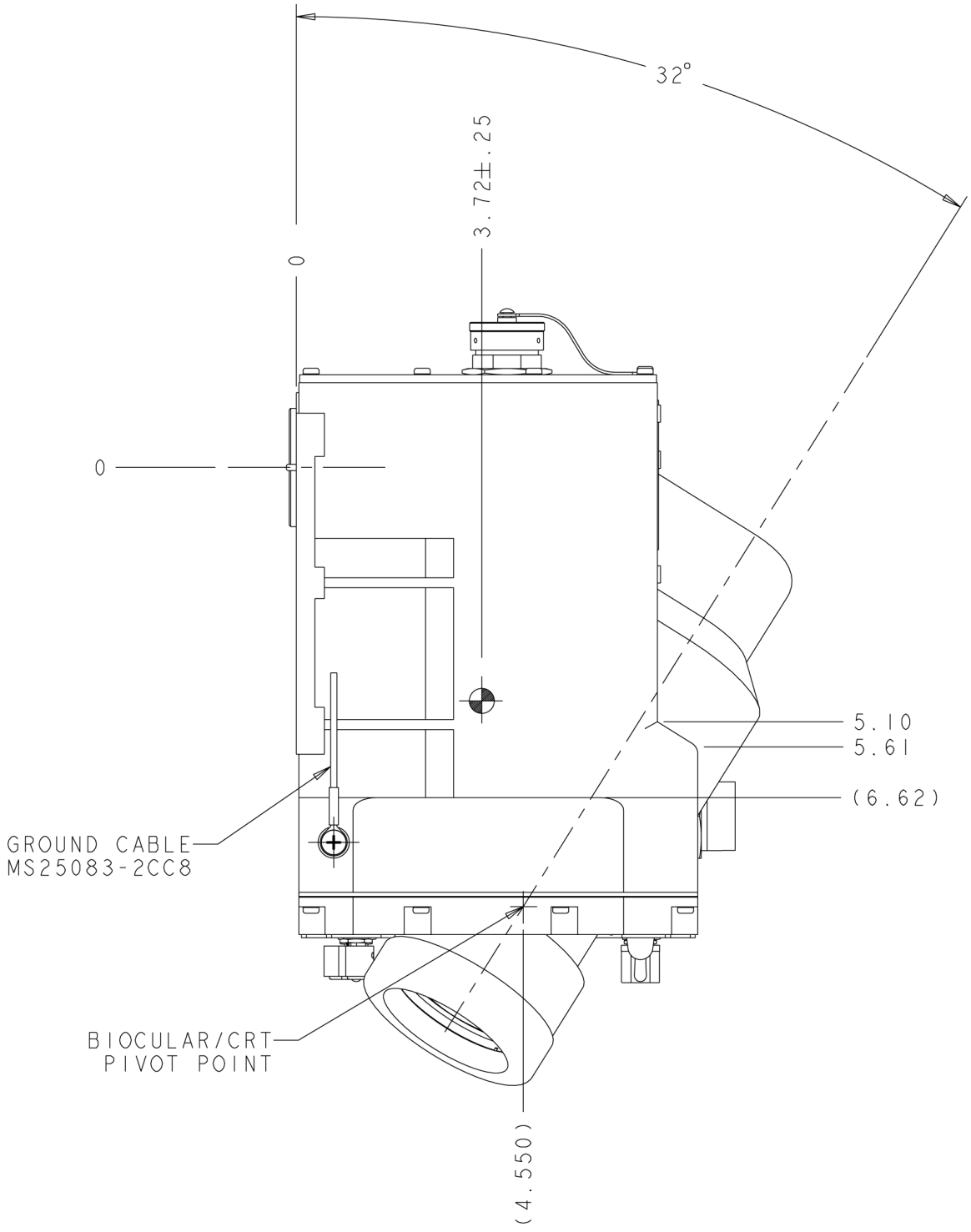


Figure 4c. SGBICU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010, ANGLES ± 0.5° unless otherwise specified

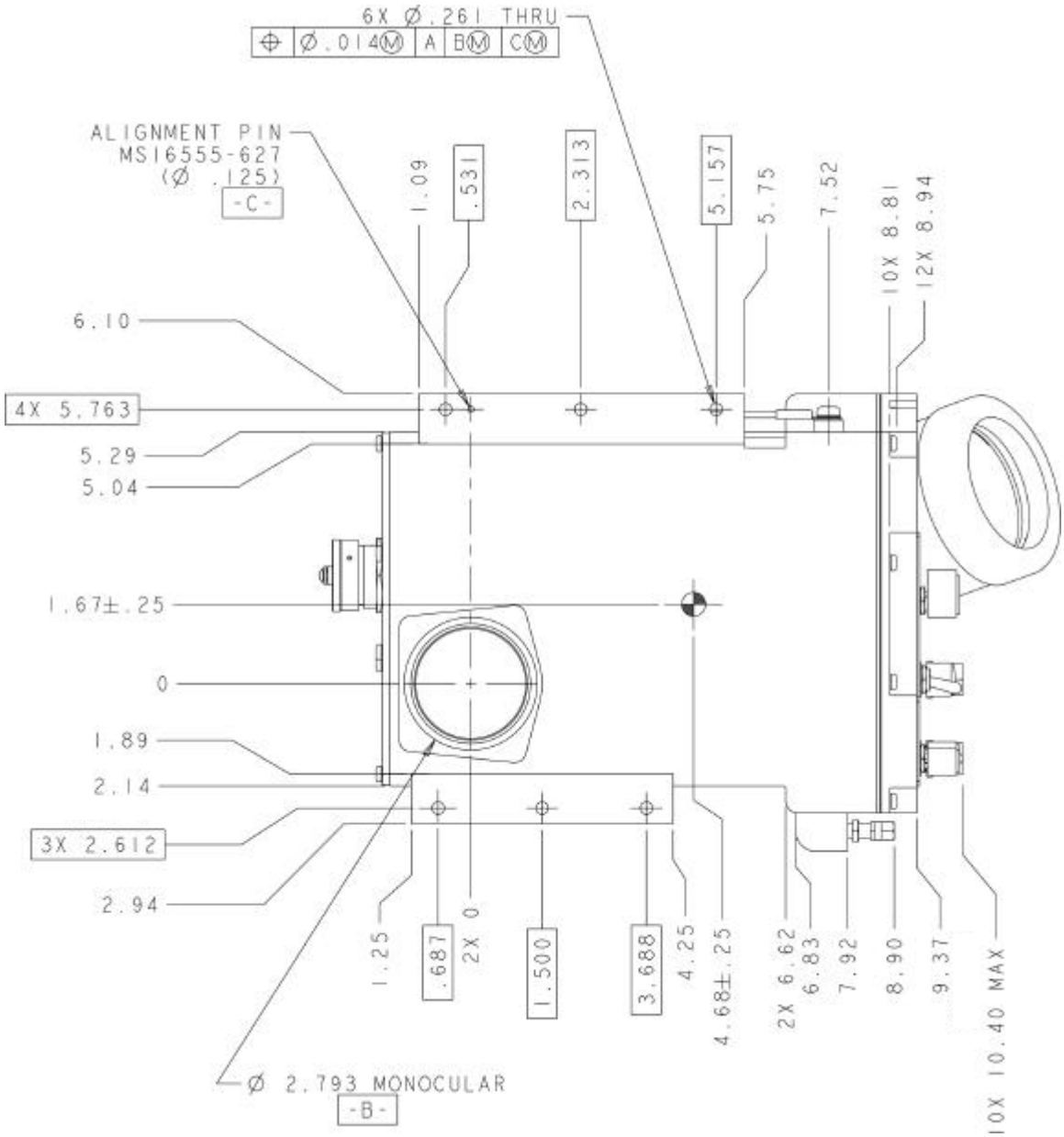


Figure 4d. SGBICU Mechanical Interface

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

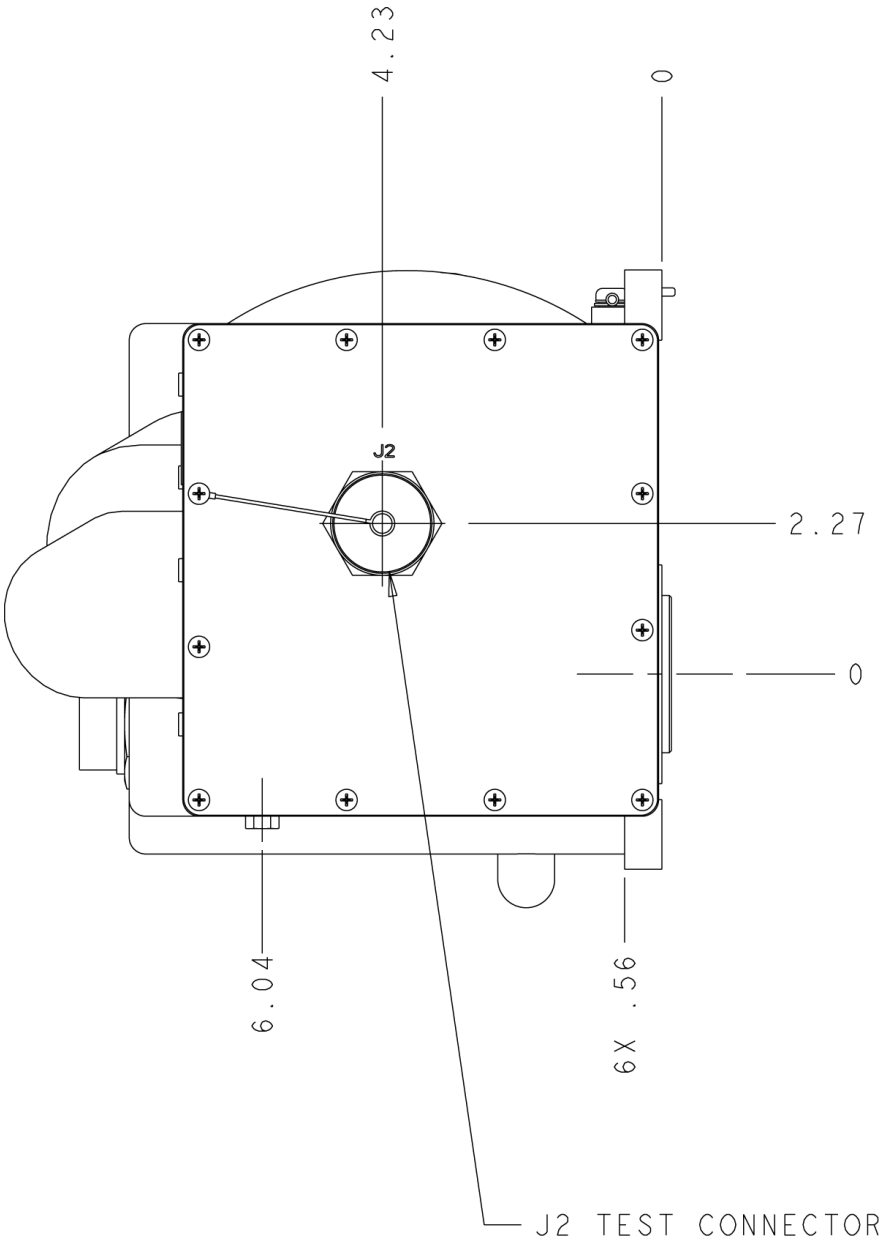


Figure 4e. SGBICU Mechanical Interface (Back View)

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

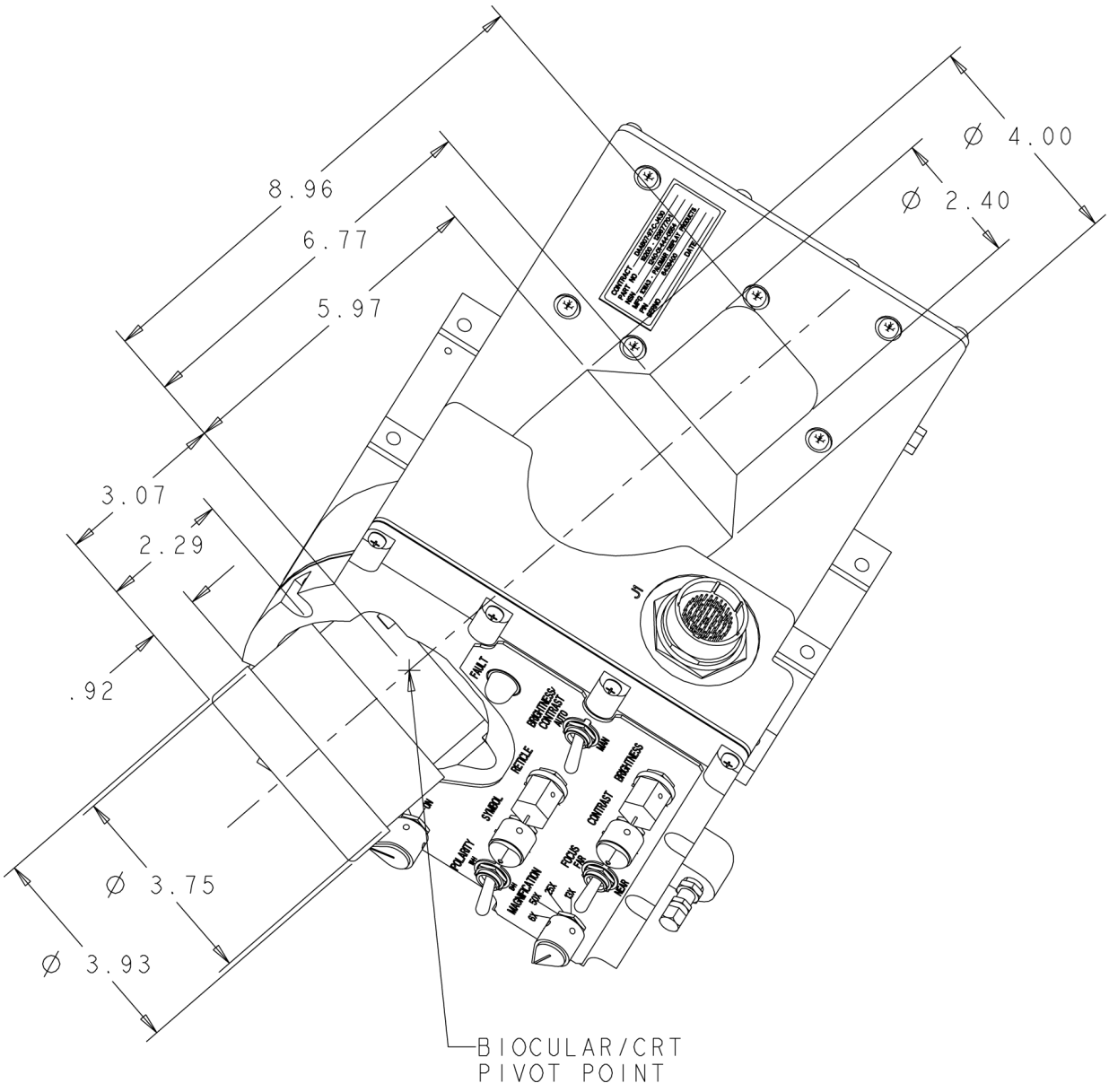


Figure 4f. SGBICU Mechanical Interface (Biocular Optics Angled View)

Note: All Dimensions .XX ± 0.03, .XXX ± 0.010 unless otherwise specified

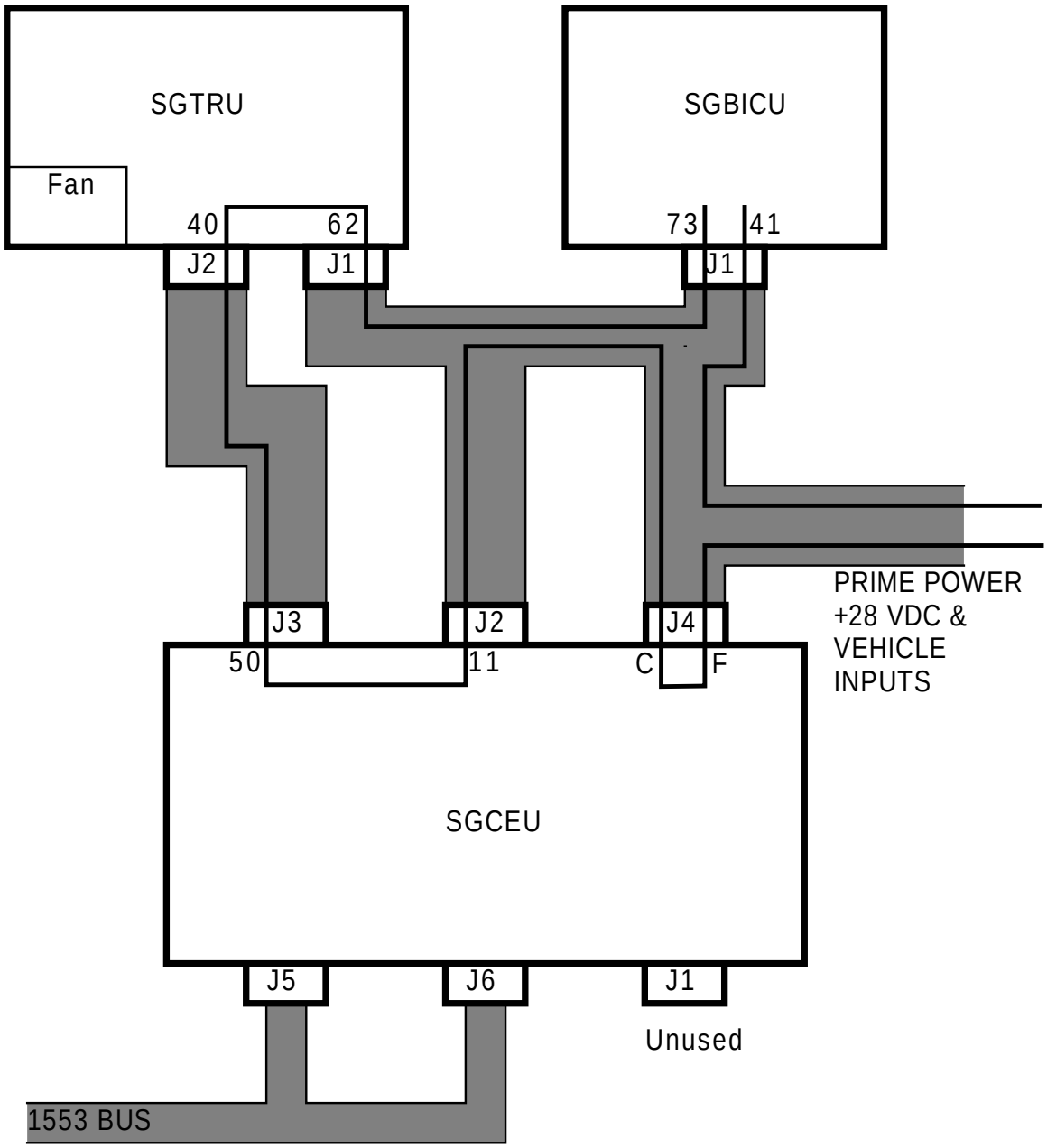


Figure 5: Suggested Cable Interlock Diagram.

Test Point Waveforms for the HTI Biocular Image Control Unit

Note: J2 is the unit test connector.

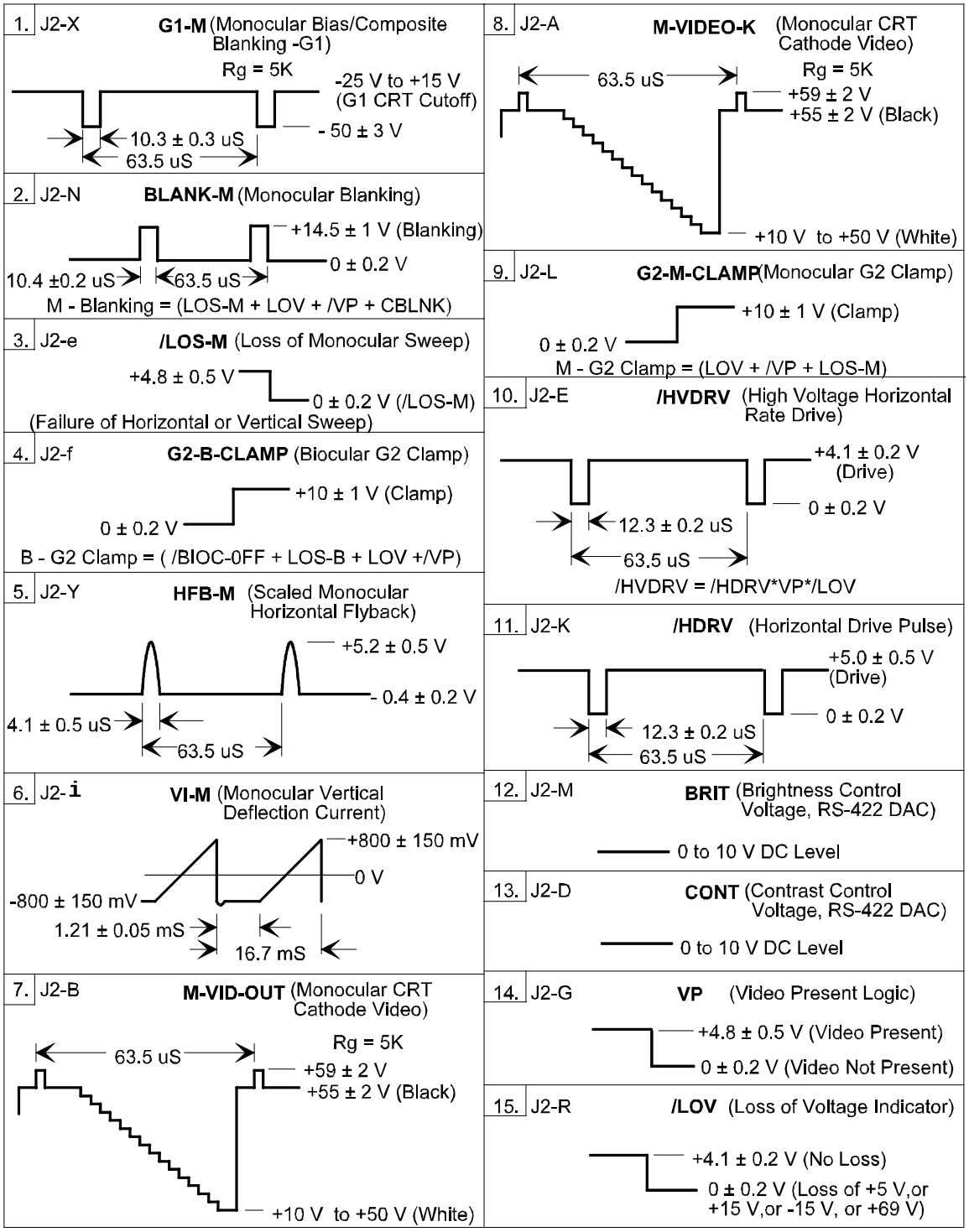


Figure 6a. BICU Test Connector Waveforms.

Test Point Waveforms for the HTI Biocular Image Control Unit (Continued)

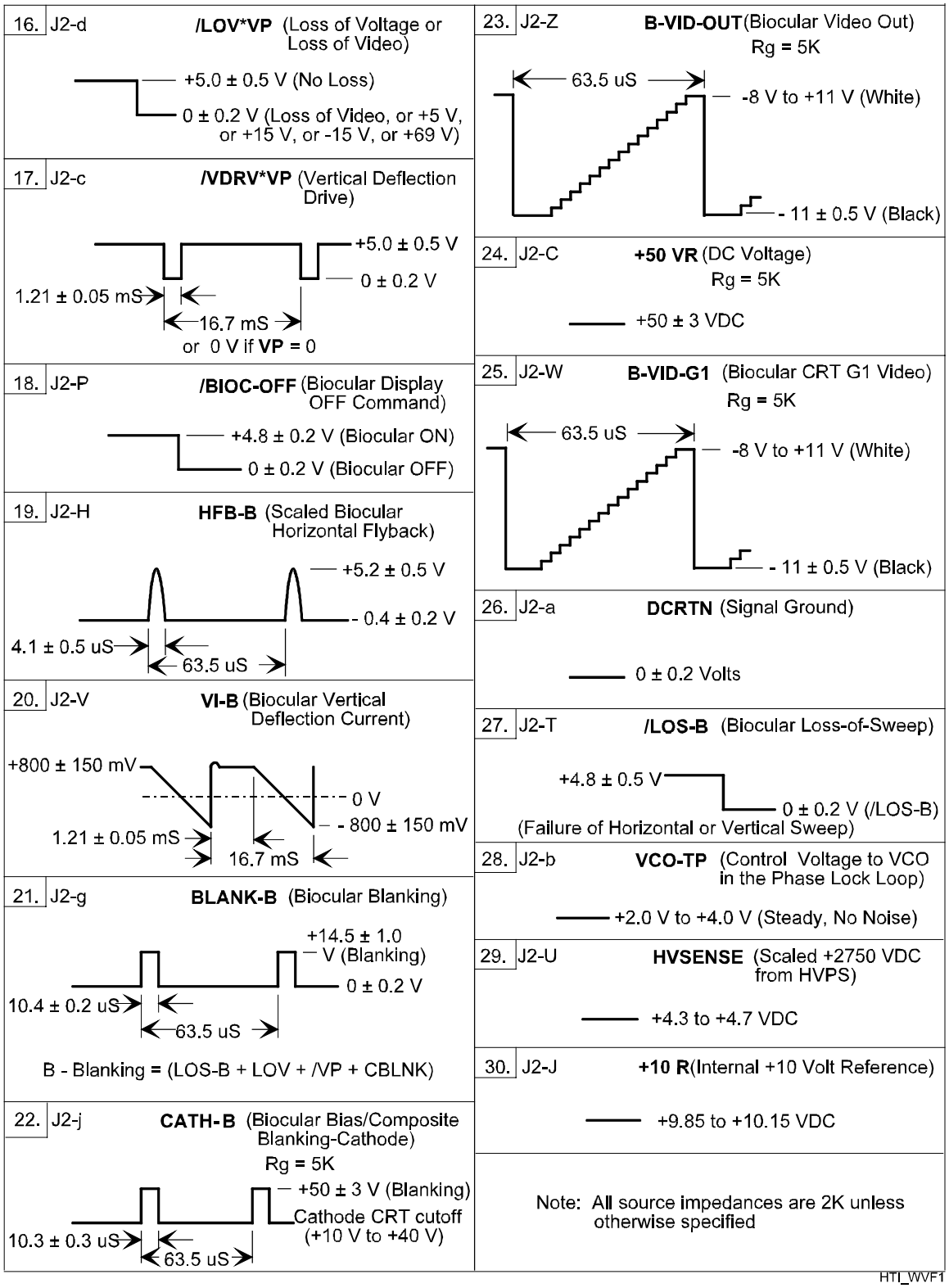


Figure 6b. BICU Test Connector Waveforms.

APPENDIX II

TABLES

Table I: SGTRU Electrical Connections And Signal Types					
CABLE: W2	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
NUC CIRCUMVENT+	53	DIGITAL VOLTAGE, TTL, LOW=0	1	SGCEU J2 - 43	I
NUC CIRCUMVENT-	54	DIGITAL VOLTAGE, TTL, LOW=0	1	SGCEU J2 - 50	I
NUC CIRCUMVENT SHIELD	32			SGCEU J2 - 51	
RT ADDR 0	4	DIGITAL VOLTAGE, TTL, LOW-0	3	SGCEU J2 - 57	O
RT ADDR 1	5	DIGITAL VOLTAGE, TTL, LOW-0	3	SGCEU J2 - 58	O
RT ADDR 2	6	DIGITAL VOLTAGE, TTL, LOW-0	3	SGCEU J2 - 59	O
RT ADDR 3	33	DIGITAL VOLTAGE, TTL, LOW-0	3	SGCEU J2 - 69	O
RT ADDR 4	7	DIGITAL VOLTAGE, TTL, LOW-0	3	SGCEU J2 - 70	O
RT ADDR PARITY	34	DIGITAL VOLTAGE, TTL, LOW-0	3	SGCEU J2 - 79	O
RT ADDR COMMON	8	RETURN FOR RT ADDR	3	SGCEU J2 - 38	O
RT SHIELD	11			SGCEU J2 - 41	
P15A	18	+15.5VDC, 0.344 AMP MAX	2	SGCEU J2 - 85	I
N15A	19	-15.5VDC, 0.344 AMP MAX	2	SGCEU J2 - 93	I
15A RTN	17	GROUND		SGCEU J2 - 97	
15A SHIELD	43	TWISTED TRIPLE		SGCEU J2 - 98	
P8A 1	3	+8VDC, 1.24 AMP MAX TWIST WITH N8A 1 AND 8A RTN	2	SGCEU J2 - 44	I
P8A 2	31	+8VDC, 1.24 AMP MAX TWIST WITH N8A 2	2	SGCEU J2 - 45	I
N8A 1	2	-8VDC, 1.24 AMP MAX TWIST WITH P8A 1 AND 8A RTN	2	SGCEU J2 - 77	I
N8A 2	30	-8VDC, 1.24 AMP MAX TWIST WITH P8A 2	2	SGCEU J2 - 86	I
8A RTN 1	29	TWIST WITH P8A 1 AND N8A 1	2	SGCEU J2 - 95	I
8A SHIELD	28			SGCEU J2 - 96	
P8B 1	23	+8VDC, 2.65 AMP MAX TWIST WITH 8B RTN 1	2	SGCEU J2 - 64	I
P8B 2	24	+8VDC, 2.65 AMP MAX TWIST WITH 8B RTN 2	2	SGCEU J2 - 65	I
P8B 3	25	+8VDC, 2.65 AMP MAX TWIST WITH 8B RTN 3	2	SGCEU J2 - 66	I
P8B 4	48	+8VDC, 2.65 AMP MAX TWIST WITH 8B RTN 4	2	SGCEU J2 - 63	I
P8B RTN 1	20	+8VDC RETURN TWIST WITH P8B 1	2	SGCEU J2 - 53	I

Table I: SGTRU Electrical Connections And Signal Types					
CABLE: W2	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
	21	+8VDC RETURN	2	SGCEU J2 - 54	I
P8B RTN 2		TWIST WITH P8B 2			
	22	TWIST WITH P8B 3	2	SGCEU J2 - 55	I
P8B RTN 3		+8VDC RETURN			
P8B RTN 4	27	TWIST WITH P8B 4	2	SGCEU J2 - 52	I
		+8VDC RETURN			
8B SHIELD	26		2	SGCEU J2 - 83	
P15B 1	13	+15VDC, 0.53 AMP MAX	2	SGCEU J2 - 90	I
		TWIST WITH 15B RTN 1 AND N15B 1			
P15B 2	14	+15VDC, 0.53 AMP MAX	2	SGCEU J2 - 91	I
		TWIST WITH 15B RTN 2 AND N15B 2			
P15B 3	39	+15VDC, 0.53 AMP MAX	2	SGCEU J2 - 92	I
		TWIST WITH N15B 3			
N15B 1	15	-15VDC, 0.53 AMP MAX	2	SGCEU J2 - 18	I
		TWIST WITH P15B 1 AND 15B RTN 1			
N15B 2	40	-15VDC, 0.53 AMP MAX	2	SGCEU J2 - 19	I
		TWIST WITH P15B 2 AND 15B RTN 2			
N15B 3	41	-15VDC, 0.53 AMP MAX	2	SGCEU J2 - 20	I
		TWIST WITH P15B 3			
15B RTN 1	37	±15VDC RETURN	2	SGCEU J2 - 60	I
		TWIST WITH P15B1 AND N15B1			
15B RTN 2	38	±15VDC RETURN MAXIMUM	2	SGCEU J2 - 62	I
		TWIST WITH P15B2 AND N15B2			
15B SHIELD	12		2	SGCEU J2 - 7	
UP	55	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 62	O
DOWN	56	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 42	O
LEFT	9	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 63	O
RIGHT	35	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 26	O
SEARCH STARE 0	45	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 61	O
SEARCH STARE 1	46	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 17	O
SEARCH STARE 2	47	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 44	O
BIT	51	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 18	O
BORESIGHT	58	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 19	O

Table I: SGTRU Electrical Connections And Signal Types					
CABLE: W2	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
FILTER 0	76	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 49	O
FILTER 1	64	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 20	O
FILTER 2	66	SWITCH CLOSURE TO GROUND	2	SGBICU J1 - 43	O
SWITCH COMMON	44	DC RETURN	2	SGBICU J1 - 52	O
LAMP POWER	36	24 V LAMP POWER	2	FCEU-J12-KK	I
LAMP POWER	10	24 V LAMP POWER	2	SGBICU J1-14	O
TRU RDY	57	SWITCHED 24 V LAMP POWER	2	SGBICU J1 - 40	O
CABLE INTERLOCK	62	CABLE CONTINUITY	2	SGBICU J1 - 73	O
J1 SPARE1	52	WIRED INTERNAL SPARE		RESERVED	
J1 SPARE2	42	WIRED INTERNAL SPARE		RESERVED	
J1 SPARE3	16	WIRED INTERNAL SPARE		RESERVED	
J1 SPARE4	77	WIRED INTERNAL SPARE		RESERVED	
NUC CIRCUMVENT+	69	DIGITAL VOLTAGE, TTL, LOW=0	1	SGBICU J1-13	O
NUC CIRCUMVENT-	70	DIGITAL VOLTAGE, TTL, LOW=0	1	SGBICU J1-38	O
NUC CIRCUMVENT SHIELD	74			SGBICU J1-FLOAT	
FOC RTN	71			SGCEU J2 - 49	
CRYO_EN	72	Switched 28 VDC to enable Cryo	2	SGBICU J1-3	I
CRYO_EN_RTN	61	28 VDC RTN	2	SGBICU J1-54	I
DC RETURN	63			RESERVED	
DC RETURN	75			RESERVED	
SPARE	1			NOT USED	
SPARE	49			NOT USED	
SPARE	50			NOT USED	
SPARE	59			NOT USED	
SPARE	60			NOT USED	
SPARE	65			NOT USED	
SPARE	67			NOT USED	
SPARE	68			NOT USED	
SPARE	73			NOT USED	
SPARE	78			NOT USED	
SPARE	79			NOT USED	

Table I: SGTRU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
DIG VID 11+	69	DIFFERENTIAL ECL TWIST WITH DIG VID 11-	6	SGCEU J3 - 93	O
DIG VID 11-	70	DIFFERENTIAL ECL TWIST WITH DIG VID 11+	6	SGCEU J3 - 92	O
DIG VID 10+	67	DIFFERENTIAL ECL TWIST WITH DIG VID 10-	6	SGCEU J3 - 99	O
DIG VID 10-	68	DIFFERENTIAL ECL TWIST WITH DIG VID 10+	6	SGCEU J3 - 100	O
DIG VID 9+	88	DIFFERENTIAL ECL TWIST WITH DIG VID 9-	6	SGCEU J3 - 75	O
DIG VID 9-	79	DIFFERENTIAL ECL TWIST WITH DIG VID 9+	6	SGCEU J3 - 76	O
DIG VID 8+	87	DIFFERENTIAL ECL TWIST WITH DIG VID 8-	6	SGCEU J3 - 54	O
DIG VID 8-	86	DIFFERENTIAL ECL TWIST WITH DIG VID 8+	6	SGCEU J3 - 55	O
DIG VID 7+	89	DIFFERENTIAL ECL TWIST WITH DIG VID 7-	6	SGCEU J3 - 7	O
DIG VID 7-	80	DIFFERENTIAL ECL TWIST WITH DIG VID 7+	6	SGCEU J3 - 13	O
DIG VID 6+	72	DIFFERENTIAL ECL TWIST WITH DIG VID 6-	6	SGCEU J3 - 34	O
DIG VID 6-	71	DIFFERENTIAL ECL TWIST WITH DIG VID 6+	6	SGCEU J3 - 44	O
DIG VID 5+	90	DIFFERENTIAL ECL TWIST WITH DIG VID 5-	6	SGCEU J3 - 23	O
DIG VID 5-	81	DIFFERENTIAL ECL TWIST WITH DIG VID 5+	6	SGCEU J3 - 24	O
DIG VID 4+	73	DIFFERENTIAL ECL TWIST WITH DIG VID 4-	6	SGCEU J3 - 12	O
DIG VID 4-	82	DIFFERENTIAL ECL TWIST WITH DIG VID 4+	6	SGCEU J3 - 6	O
DIG VID 3+	83	DIFFERENTIAL ECL TWIST WITH DIG VID 3-	6	SGCEU J3 - 16	O
DIG VID 3-	74	DIFFERENTIAL ECL TWIST WITH DIG VID 3+	6	SGCEU J3 - 25	O
DIG VID 2+	99	DIFFERENTIAL ECL TWIST WITH DIG VID 2-	6	SGCEU J3 - 3	O
DIG VID 2-	98	DIFFERENTIAL ECL TWIST WITH DIG VID 2+	6	SGCEU J3 - 4	O

Table I: SGTRU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
DIG VID 1+	92	DIFFERENTIAL ECL TWIST WITH DIG VID 1-	6	SGCEU J3 - 9	O
DIG VID 1-	91	DIFFERENTIAL ECL TWIST WITH DIG VID 1+	6	SGCEU J3 - 8	O
DIG VID 0+	93	DIFFERENTIAL ECL TWIST WITH DIG VID 0-	6	SGCEU J3 - 2	O
DIG VID 0-	84	DIFFERENTIAL ECL TWIST WITH DIG VID 0+	6	SGCEU J3 - 1	O
ID 0+	31	DIFFERENTIAL ECL TWIST WITH ID 0-	6	SGCEU J3 - 90	O
ID 0-	32	DIFFERENTIAL ECL TWIST WITH ID 0+	6	SGCEU J3 - 94	O
ID 1+	6	DIFFERENTIAL ECL TWIST WITH ID 1-	6	SGCEU J3 - 96	O
ID 1-	13	DIFFERENTIAL ECL TWIST WITH ID 1+	6	SGCEU J3 - 95	O
COL SYNC+	4	DIFFERENTIAL ECL TWIST WITH COL SYNC-	6	SGCEU J3 - 53	O
COL SYNC-	12	DIFFERENTIAL ECL TWIST WITH COL SYNC+	6	SGCEU J3 - 52	O
DIG VID CLOCK+	10	DIFFERENTIAL ECL, 33MHZ NOMINAL TWIST WITH DIG VID CLOCK-	6	SGCEU J3 - 18	O
DIG VID CLOCK-	1	DIFFERENTIAL ECL, 33MHZ NOMINAL TWIST WITH DIG VID CLOCK+	6	SGCEU J3 - 17	O
DIG VID SHIELD	100			SGCEU J3 - 14	
SCAN RX DATA+	62	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN RX DATA-	1	SGCEU J3 - 5	O
SCAN RX DATA-	61	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN RX DATA+	1	SGCEU J3 - 11	O
SCAN TX DATA+	58	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN TX DATA-	1	SGCEU J3 - 63	I
SCAN TX DATA-	57	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN TX DATA+	1	SGCEU J3 - 64	I
SCAN CLK+	59	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN CLK-	1	SGCEU J3 - 22	I
SCAN CLK-	60	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN CLK+	1	SGCEU J3 - 33	I
SCAN SYNC+	18	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN SYNC-	1	SGCEU J3 - 31	I

Table I: SGTRU Electrical Connections And Signal Types

CABLE:	CABLE CONNECTOR:		SGTRU CONNECTOR: J2		
COMMON SIGNAL DESCRIPTION					
NAME	PIN NO.	SIGNAL AND INTERFACE CHARACTERISTICS	EMI CODE	TO UNIT/CONN & PIN	I/O
SCAN SYNC-	17	DIGITAL VOLTAGE, RS-422	1	SGCEU J3 - 43	I
		TWIST WITH SCAN SYNC+			
SCAN SHIELD	56			SGCEU J3 - 21	
FOCUS DISABLE	64	DIGITAL, TTL VOLTAGE LEVELS	7	SGCEU J3 - 72	I
FOCUS STEP	75	DIGITAL, TTL VOLTAGE LEVELS	7	SGCEU J3 - 73	I
FOCUS DIR	85	DIGITAL, TTL VOLTAGE LEVELS	7	SGCEU J3 - 74	I
FOCUS COMMON	63	+ 5VDC	7	SGCEU J3 - 47	I
FOCUS CMD SHIELD	33			SGCEU J3 - 32	
FOV DRIVE+	50	DC MOTOR, 0 TO +15 VDC	2	SGCEU J3 - 85	I
		TWIST WITH FOV DRIVE-			
FOV DRIVE-	49	DC MOTOR, 0 TO +15 VDC	2	SGCEU J3 - 84	I
		TWIST WITH FOV DRIVE+			
FOV DRIVE SHIELD	42			SGCEU J3 - 48	
FILTER DRIVE+	8	DC MOTOR, 0 TO +14VDC	2	SGCEU J3 - 66	I
		TWIST WITH FILTER DRIVE-			
FILTER DRIVE-	16	DC MOTOR, 0 TO +14VDC	2	SGCEU J3 - 65	I
		TWIST WITH FILTER DRIVE+			
FILTER POT HI	35	ANALOG VOLTAGE, ±10VDC	4	SGCEU J3 - 81	I
		TWIST WITH FILTER POT WIPER AND FILTER POT LO			
FILTER POT WIPER	25	ANALOG VOLTAGE, ±10VDC	4	SGCEU J3 - 82	O
		TWIST WITH FILTER POT HI AND FILTER POT LO			
FILTER POT LO	46	ANALOG VOLTAGE, ±10VDC	4	SGCEU J3 - 83	I
		TWIST WITH FILTER POT WIPER AND FILTER POT HI			
FILTER DRIVE SHIELD	26			SGCEU J3 - 51	
28V COOLER/FAN 1	45	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS)	2	SGCEU J3 - 68	I
		TWIST WITH 28V COOLER/FAN RTN 1			
28V COOLER/FAN 2	55	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 2	2	SGCEU J3 - 77	I
28V COOLER/FAN 3	19	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 3	2	SGCEU J3 - 58	I

Table I: SGTRU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
28V COOLER/FAN 4	20	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 4	2	SGCEU J3 - 39	I
28V COOLER/FAN 5	44	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 5	2	SGCEU J3 - 38	I
28V COOLER/FAN RTN 1	65	+28VDC RETURN TWIST WITH 28V COOLER/FAN 1	2	SGCEU J3 - 56	I
28V COOLER/FAN RTN 2	66	+28VDC RETURN TWIST WITH 28V COOLER/FAN 2	2	SGCEU J3 - 57	I
28V COOLER/FAN RTN 3	21	+28VDC RETURN TWIST WITH 28V COOLER/FAN 3	2	SGCEU J3 - 46	I
28V COOLER/FAN RTN 4	22	+28VDC RETURN TWIST WITH 28V COOLER/FAN 4	2	SGCEU J3 - 37	I
28V COOLER/FAN RTN 5	23	+28VDC RETURN TWIST WITH 28V COOLER/FAN 5	2	SGCEU J3 - 27	I
28V COOLER FAN SHIELD	34			SGCEU J3 - 67	
SENSOR FAN HALL	3	Hall Effect Speed Sensor	2	SGCEU J3-40	O
SENSOR FAN RETURN	2	28 VDC RTN	2	SGCEU J3-41	O
TRS DRIVE 1+	41	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE1-	2	SGCEU J3 - 87	I
TRS DRIVE 1-	51	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE1+	2	SGCEU J3 - 86	I
TRS DRIVE 2+	96	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE2-	2	SGCEU J3 - 89	I
TRS DRIVE 2-	97	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE2+	2	SGCEU J3 - 88	I
TRS DRIVE SHIELD	47			SGCEU J3 - 61	
FOV NARROW	43	FOV POSITION, TTL	7	SGCEU J3 - 36	I
FOV WIDE	52	FOV POSITION, TTL	7	SGCEU J3 - 35	I
FOV COMMON	53	FOV POSITION, TTL	7	SGCEU J3 - 49	I
SCAN IO TEST+	37			SGTRU TEST	O
SCAN IO TEST-	38			SGTRU TEST	O
DIG IO TEST+	30			SGTRU TEST	O
DIG IO TEST-	29			SGTRU TEST	O
CABLE INTERLOCK	40	CABLE INTERLOCK	2	SGCEU J3 - 50	O

Table I: SGTRU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGTRU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
EU J3 SPARE 1	14	TWIST WITH EU J3 SPARE 2		SGCEU J3 - 69	
EU J3 SPARE 2	15	TWIST WITH EU J3 SPARE 1		SGCEU J3 - 78	
EU J3 SPARE 3	24	TWIST WITH EU J3 SPARE 4		SGCEU J3 - 79	
EU J3 SPARE 4	39	TWIST WITH EU J3 SPARE 3		SGCEU J3 - 80	
EU J3 SPARE 5	11	SPARE WIRE		SGCEU J3 - 59	
SPARE	5			NOTUSED	
SPARE	7			NOTUSED	
SPARE	9			NOTUSED	
SPARE	27			NOTUSED	
SPARE	28			NOTUSED	
SPARE	36			NOTUSED	
SPARE	48			NOTUSED	
SPARE	54			NOTUSED	
SPARE	76			NOTUSED	
AF SPARE 1	77			RESERVED	
AF SPARE 2	78			RESERVED	
AF SPARE 3	95			RESERVED	
SPARE	94			NOTUSED	

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
TCK	112	TEST DATA CLOCK	7	SGCEU	TEST
TDI	88	TEST DATA IN	7	SGCEU	TEST
TMS	102	TEST SYNC	7	SGCEU	TEST
TDO	100	TEST DATA OUT	7	SGCEU	TEST
TRST	99	TEST DATA OFF	7	SGCEU	TEST
DGND	108			SGCEU	TEST
RX DATA C+	109	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
RX DATA C-	110	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
TX DATA C+	125	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
TX DATA C-	119	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
DGND	11			SGCEU	TEST
RX DATA D+	14	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
RX DATA D-	32	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
TX DATA D+	31	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
TX DATA D-	30	SPARE RS-422 SERIAL PORT	1	SGCEU	TEST
DGND	15			SGCEU	TEST
BUS A-	61	1553 DIFFERENTIAL VOLTAGE	3	SGCEU	TEST
BUS A+	62	1553 DIFFERENTIAL VOLTAGE	3	SGCEU	TEST
DGND	24			SGCEU	TEST
BUS B-	27	1553 DIFFERENTIAL VOLTAGE	3	SGCEU	TEST
BUS B+	63	1553 DIFFERENTIAL VOLTAGE	3	SGCEU	TEST
DGND	6			SGCEU	TEST
RS 170 C	76	RS-170 OUT	5	SGCEU	TEST
DGND	66			SGCEU	TEST
RS 170 F	1	RS-170 OUT	5	SGCEU	TEST
DGND	77			SGCEU	TEST
RS 170 G+	55	RS-170 OUT	5	SGCEU	TEST
RS 170 G-	67	RS-170 OUT	5	SGCEU	TEST
RS 170 G	54	RS-170 OUT	5	SGCEU	TEST
DGND	78			SGCEU	TEST
ASYNC IN2+	68	ASYNC RS-170 INPUTS	5	SGCEU	TEST
ASYNC IN2-	56	ASYNC RS-170 INPUTS	5	SGCEU	TEST
COMP VID0+	81	PECL VOLTAGE	6	SGCEU	TEST
COMP VID0-	92	PECL VOLTAGE	6	SGCEU	TEST
COMP VID1+	113	PECL VOLTAGE	6	SGCEU	TEST
COMP VID1-	114	PECL VOLTAGE	6	SGCEU	TEST

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
COMP VID2+	128	PECL VOLTAGE	6	SGCEU	TEST
COMP VID2-	120	PECL VOLTAGE	6	SGCEU	TEST
COMP VID3+	118	PECL VOLTAGE	6	SGCEU	TEST
COMP VID3-	126	PECL VOLTAGE	6	SGCEU	TEST
COMP VID4+	103	PECL VOLTAGE	6	SGCEU	TEST
COMP VID4-	104	PECL VOLTAGE	6	SGCEU	TEST
COMP VID5+	124	PECL VOLTAGE	6	SGCEU	TEST
COMP VID5-	117	PECL VOLTAGE	6	SGCEU	TEST
COMP VID6+	122	PECL VOLTAGE	6	SGCEU	TEST
COMP VID6-	116	PECL VOLTAGE	6	SGCEU	TEST
COMP VID7+	115	PECL VOLTAGE	6	SGCEU	TEST
COMP VID7-	106	PECL VOLTAGE	6	SGCEU	TEST
COMP VID CLK+	107	PECL VOLTAGE	6	SGCEU	TEST
COMP VID CLK-	96	PECL VOLTAGE	6	SGCEU	TEST
COMP LINE SYNC+	84	DIFFERENTIAL PECL	6	SGCEU	TEST
COMP LINE SYNC-	72	DIFFERENTIAL PECL	6	SGCEU	TEST
COMP FIELD SYNC+	94	DIFFERENTIAL ECL	6	SGCEU	TEST
COMP FIELD SYNC-	105	DIFFERENTIAL ECL	6	SGCEU	TEST
COMP FIELD ID+	71	DIFFERENTIAL ECL	6	SGCEU	TEST
COMP FIELD ID-	82	DIFFERENTIAL ECL	6	SGCEU	TEST
DGND	83			SGCEU	TEST
UCOMP VID0+	60	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID0-	59	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID1+	48	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID1-	36	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID2+	3	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID2-	4	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID3+	25	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID3-	37	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID4+	26	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID4-	38	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID5+	8	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID5-	17	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID6+	2	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID6-	9	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID7+	5	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID7-	13	DIFFERENTIAL PECL	6	SGCEU	TEST

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
UCOMP VID8+	10	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID8-	12	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID9+	20	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID9-	21	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID10+	79	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID10-	80	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID11+	90	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID11-	89	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID CLK+	23	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP VID CLK-	33	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP COL SYNC+	121	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP COL SYNC-	127	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP ID0+	57	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP ID0-	58	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP ID1+	70	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP ID1-	69	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP FLD SYNC+	34	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP FLD SYNC-	35	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP PIX FLG+	22	DIFFERENTIAL PECL	6	SGCEU	TEST
UCOMP PIX FLG-	7	DIFFERENTIAL PECL	6	SGCEU	TEST
DGND	91			SGCEU	TEST
INST PORT D0	49	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D3	51	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D5	40	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT STRB	42	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT RDY	43	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D1	50	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D4	39	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D6	41	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT REQ	44	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D2	45	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT D7	46	SINGLE ENDED TTL	7	SGCEU	TEST
INST PORT ACK	47	SINGLE ENDED TTL	7	SGCEU	TEST
DGND	93			SGCEU	TEST
EMU0	101	C40 EMULATOR SIGNALS	7	SGCEU	TEST
EMU1	111	C40 EMULATOR SIGNALS	7	SGCEU	TEST
CABLE INTERLOCK	52	Cable continuity test signals,	7	SGCEU	TEST

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
CABLE INTERLOCK	75	Jumpered together internal to SGCEU	7	SGCEU	TEST

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
NUC CIRCUMVENT+	43	DIGITAL VOLTAGE, TTL, LOW=0	1	SGTRU J1 - 53	O
NUC CIRCUMVENT-	50	DIGITAL VOLTAGE, TTL, LOW=0	1	SGTRU J1 - 54	O
NUC CIRCUMVENT SHIELD	51		1	SGTRU J1 - 32	
RS 170 A	37	RS-170 OUT, UNBALANCED	5	RESERVED	O
RS 170 B	48	RS-170 OUT, UNBALANCED	5	RESERVED	O
DGND	12		5	RESERVED	
RS 170 D	35	RS-170 OUT, UNBALANCED	5	RESERVED	O
RS 170 E	47	RS-170 OUT, UNBALANCED	5	RESERVED	O
RS 170 A+	14	RS-170 OUT, BALANCED 75 Ω TWINAX WIRE	5	SGBICU J1 - 9	O
RS 170 A-	23	RS-170 OUT, BALANCED 75 Ω TWINAX WIRE	5	SGBICU J1 - 35	O
RS 170 A SHIELD	10		5	SGBICU J1 - 36	
RS 170 B+	13	RS-170 OUT, BALANCED	5	RESERVED	O
RS 170 B-	6	RS-170 OUT, BALANCED	5	RESERVED	O
RS 170 D+	5	RS-170 OUT, BALANCED	5	SGBICU J1 - 6	O
RS 170 D-	4	RS-170 OUT, BALANCED 75 Ω TWINAX WIRE	5	SGBICU J1 - 5	O
RS 170 D SHIELD	15		5	SGBICU J1 - 33	
RS 170 E+	3	RS-170 OUT, BALANCED	5	RESERVED	O
RS 170 E-	2	RS-170 OUT, BALANCED	5	RESERVED	O
A KIT TX DATA+	8	DIGITAL VOLTAGE, RS-422 TWIST WITH A KIT TX DATA-	1	SGBICU J1 - 60	O
A KIT TX DATA-	17	DIGITAL VOLTAGE, RS-422 TWIST WITH A KIT TX DATA+	1	SGBICU J1 - 15	O
A KIT RX DATA+	1	DIGITAL VOLTAGE, RS-422 TWIST WITH A KIT RX DATA-	1	SGBICU J1 - 74	I
A KIT RX DATA-	9	DIGITAL VOLTAGE, RS-422 TWIST WITH A KIT RX DATA-	1	SGBICU J1 - 16	I
A KIT SERIAL SHIELD	30		1	SGBICU J1 - FLOAT	
RT ADDR 0	57	DIGITAL VOLTAGE, TTL, LOW-0	3	SGTRU J1 - 4	I
RT ADDR 1	58	DIGITAL VOLTAGE, TTL, LOW-0	3	SGTRU J1 - 5	I

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
RT ADDR 2	59	DIGITAL VOLTAGE, TTL, LOW-0	3	SGTRU J1 - 6	I
RT ADDR 3	69	DIGITAL VOLTAGE, TTL, LOW-0	3	SGTRU J1 - 33	I
RT ADDR 4	70	DIGITAL VOLTAGE, TTL, LOW-0	3	SGTRU J1 - 7	I
RT ADDR PARITY	79	DIGITAL VOLTAGE, TTL, LOW-0	3	SGTRU J1 - 34	I
RT ADDR COMMON	38		3	SGTRU J1 - 8	I
RT SHIELD	41			SGTRU J1 - 11	
P15A	85	+15.5VDC, 0.344 AMP MAX	2	SGTRU J1 - 18	O
N15A	93	-15.5VDC, 0.344 AMP MAX	2	SGTRU J1 - 19	O
15A RTN	97	TWISTED TRIPLE	2	SGTRU J1 - 17	O
15A SHIELD	98			SGTRU J1 - 43	
P8A 1	44	+8VDC, 1.24 AMP MAX TWIST WITH N8A 1 AND 8A RTN 1	2	SGTRU J1 - 3	O
P8A 2	45	+8VDC, 1.24 AMP MAX TWIST WITH N8A 2	2	SGTRU J1 - 31	O
N8A 1	77	-8VDC, 1.24 AMP MAX TWIST WITH P8A 1 AND 8A RTN	2	SGTRU J1 - 2	O
N8A 2	86	-8VDC, 1.24 AMP MAX TWIST WITH P8A 2	2	SGTRU J1 - 30	O
8A RTN 1	95	±8VDC RETURN TWIST WITH N8A 1 AND P8A 1	2	SGTRU J1 - 29	O
8A SHIELD	96			SGTRU J1 - 28	
P5J	24	5 VOLT DIG POWER,1.0 AMP	2	SGBICU J1 - 28	0
P5J RTN	61	TWISTED PAIR	2	SGBICU J1 - 1	O
P5J SHIELD	84			SGBICU J1 - FLOAT	
P8B 1	64	+8VDC, 2.65 AMP MAX TWIST WITH P8B RTN 1	2	SGTRU J1 - 23	O
P8B 2	65	+8VDC, 2.65 AMP MAX TWIST WITH P8B RTN 2	2	SGTRU J1 - 24	O
P8B 3	66	+8VDC, 2.65 AMP MAX TWIST WITH P8B RTN 3	2	SGTRU J1 - 25	O
P8B 4	63	+8VDC, 2.65 AMP MAX TWIST WITH P8B RTN 4	2	SGTRU J1 - 48	O
P8B RTN 1	53	±8VDC RETURN TWIST WITH P8B 1	2	SGTRU J1 - 20	O

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
	54	±8VDC RETURN	2	SGTRU J1 - 21	O
P8B RTN 2		TWIST WITH P8B 2			
	55	±8VDC RETURN	2	SGTRU J1 - 22	O
P8B RTN 3		TWIST WITH P8B 3			
P8B RTN 4	52	±8VDC RETURN	2	SGTRU J1 - 27	O
		TWIST WITH P8B 4			
8B SHIELD	83			SGTRU J1 - 26	
70 VDC	34	70 VOLT DISPLAY POWER	2	SGBICU J1 - 8	O
70 VDC RTN	31	TWISTED PAIR	2	SGBICU J1 - 30	O
70 VDC SHIELD	29			SGBICU J1 - FLT	
	90	+15VDC, 0.53 AMP MAX TWIST WITH N15B 1 AND 15B RTN 1	2	SGTRU J1 - 13	O
P15B 1					
	91	+15VDC, 0.53 AMP MAX TWIST WITH N15B 2 AND 15B RTN 2	2	SGTRU J1 - 14	O
P15B 2					
	92	+15VDC, 0.53 AMP MAX TWIST WITH N15B 3	2	SGTRU J1 - 39	O
P15B 3					
	18	+15VDC, 0.53 AMP MAX TWIST WITH P15B 1 AND	2	SGTRU J1 - 15	O
N15B 1		15B RTN 1			
	19	+15VDC, 0.53 AMP MAX TWIST WITH P15B 2 AND 15B RTN 2	2	SGTRU J1 - 40	O
N15B 2					
	20	+15VDC, 0.53 AMP MAX TWIST WITH P15B 3	2	SGTRU J1 - 41	O
N15B 3					
15B RTN 1	60	±15VDC RETURN TWIST WITH P15B 1 AND N15B 1	2	SGTRU J1 - 37	O
15B RTN 2	62	±15VDC RETURN TWIST WITH P15B 2 AND N15B 2	2	SGTRU J1 - 38	O
15B SHIELD	7		2	SGTRU J1 - 12	
P15D 1	99	+15VDC, 0.40 AMP MAX	2	SGBICU J1 - 7	O
		TWIST WITH N15D1 & 15D RTN 1			
P15D 2	100	+15VDC, 0.40 AMP MAX	2	SGBICU J1 - 34	O
		TWIST WITH N15D2 & 15D RTN 2			
N15D 2	94	-15VDC, 0.40 AMP MAX	2	SGBICU J1 - 32	O
		TWIST WITH P15D2 & 15D RTN 2			

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
N15D 1	87	-15VDC, 0.40 AMP MAX TWIST WITH P15D1 & 15D RTN 1	2	SGBICU J1 - 4	O
15D RTN 1	42	-15VDC, 0.40 AMP MAX TWIST WITH N15D1 & P15D1	2	SGBICU J1 - 31	O
15D RTN 2	71	-15VDC, 0.40 AMP MAX TWIST WITH N15D2 & P15D2	2	SGBICU J1 - 2	O
15D SHIELD	82		2	SGBICU J1 - FLT	
FOC RTN	49	DC RETURN		TRU J1 - 71	
BKIT_EN_RTN	67	28 VDC RTN	2	SGCEU J2-68	O
BKIT_EN	68	Filtered 28 VDC	2	SGCEU J2-67	O
AKIT_EN_RTN	80	28 VDC RTN	2	SGBICU J1-79	O
AKIT_EN	81	Filtered 28 VDC	2	SGBICU J1-78	O
SYNC IN+	22	0 TO 1V ANALOG		RESERVED	I
SYNC IN-	21	0 TO 1V ANALOG		RESERVED	I
ASYNC INI+	33	ASYNCRONOUS RS-170 INPUT		RESERVED	I
ASYNC INI-	32	ASYNCRONOUS RS-170 INPUT		RESERVED	I
H DRIVE+	26	RS-422 VOLTAGE		RESERVED	O
H DRIVE -	16	RS-422 VOLTAGE		RESERVED	O
V DRIVE+	25	RS-422 VOLTAGE		RESERVED	O
V DRIVE-	36	RS-422 VOLTAGE		RESERVED	O
TV 4 3 CLOCK+	39	4:3 VID CLOCK, SINGLE END TTL		RESERVED	I
TV 4 3 CLOCK-	40	4:3 VID CLOCK, SINGLE END TTL		RESERVED	I
FILT SEL1	46	TTL HI VOLTAGE		RESERVED	
FILT SEL2	27	TTL HI VOLTAGE		RESERVED	

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
CABLE TEST	11	CABLE INTERLOCK		SGCEU J4 - C	O
EU J2 SPARE 1	72			RESERVED	
EU J2 SPARE 2	76			RESERVED	
EU J2 SPARE 3	75	SPARE WIRE IN CABLE		SGBICU J1 - 76	
EU J2 SPARE 4	74	TWIST WITH EU J2 SPARE 5		SGBICU J1 - 37	
EU 2 SPARE 5	73	TWIST WITH EU J2 SPARE 4		SGBICU J1 - 51	
SPARE	28			NOT USED	
SPARE	56			NOT USED	
SPARE	78			NOT USED	
SPARE	88			NOT USED	
SPARE	89			NOT USED	

Table II: SGCEU Electrical Connections And Signal Types

CABLE:	CABLE CONNECTOR:		SGCEU CONNECTOR: J3		
COMMON SIGNAL DESCRIPTION					
NAME	PIN NO.	SIGNAL AND INTERFACE CHARACTERISTICS	EMI CODE	SOURCE	I/O
DIG VID 11+	93	DIFFERENTIAL ECL TWIST WITH DIG VID 11-	6	SGTRU J2 - 69	I
DIG VID 11-	92	DIFFERENTIAL ECL TWIST WITH DIG VID 11+	6	SGTRU J2 - 70	I
DIG VID 10+	99	DIFFERENTIAL ECL TWIST WITH DIG VID 10-	6	SGTRU J2 - 67	I
DIG VID 10-	100	DIFFERENTIAL ECL TWIST WITH DIG VID 10+	6	SGTRU J2 - 68	I
DIG VID 9+	75	DIFFERENTIAL ECL TWIST WITH DIG VID 9-	6	SGTRU J2 - 88	I
DIG VID 9-	76	DIFFERENTIAL ECL TWIST WITH DIG VID 9+	6	SGTRU J2 - 79	I
DIG VID 8+	54	DIFFERENTIAL ECL TWIST WITH DIG VID 8-	6	SGTRU J2 - 87	I
DIG VID 8-	55	DIFFERENTIAL ECL TWIST WITH DIG VID 8+	6	SGTRU J2 - 86	I
DIG VID 7+	7	DIFFERENTIAL ECL TWIST WITH DIG VID 7-	6	SGTRU J2 - 89	I
DIG VID 7-	13	DIFFERENTIAL ECL TWIST WITH DIG VID 7+	6	SGTRU J2 - 80	I
DIG VID 6+	34	DIFFERENTIAL ECL TWIST WITH DIG VID 6-	6	SGTRU J2 - 72	I
DIG VID 6-	44	DIFFERENTIAL ECL TWIST WITH DIG VID 6+	6	SGTRU J2 - 71	I
DIG VID 5+	23	DIFFERENTIAL ECL TWIST WITH DIG VID 5-	6	SGTRU J2 - 90	I
DIG VID 5-	24	DIFFERENTIAL ECL TWIST WITH DIG VID 5+	6	SGTRU J2 - 81	I
DIG VID 4+	12	DIFFERENTIAL ECL TWIST WITH DIG VID 4-	6	SGTRU J2 - 73	I
DIG VID 4-	6	DIFFERENTIAL ECL TWIST WITH DIG VID 4+	6	SGTRU J2 - 82	I
DIG VID 3+	16	DIFFERENTIAL ECL TWIST WITH DIG VID 3-	6	SGTRU J2 - 83	I
DIG VID 3-	25	DIFFERENTIAL ECL TWIST WITH DIG VID 3+	6	SGTRU J2 - 74	I
DIG VID 2+	3	DIFFERENTIAL ECL TWIST WITH DIG VID 2-	6	SGTRU J2 - 99	I
DIG VID 2-	4	DIFFERENTIAL ECL TWIST WITH DIG VID 2+	6	SGTRU J2 - 98	I
DIG VID 1+	9	DIFFERENTIAL ECL TWIST WITH DIG VID 1-	6	SGTRU J2 - 92	I

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J3**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**SOURCE**	**I/O**
DIG VID 1-	8	DIFFERENTIAL ECL TWIST WITH DIG VID 1+	6	SGTRU J2 - 91	I
DIG VID 0+	2	DIFFERENTIAL ECL TWIST WITH DIG VID 0-	6	SGTRU J2 - 93	I
DIG VID 0-	1	DIFFERENTIAL ECL TWIST WITH DIG VID 0+	6	SGTRU J2 - 84	I
ID 0+	90	DIFFERENTIAL ECL TWIST WITH ID 0-	6	SGTRU J2 - 31	I
ID 0-	94	DIFFERENTIAL ECL TWIST WITH ID 0+	6	SGTRU J2 - 32	I
ID 1+	96	DIFFERENTIAL ECL TWIST WITH ID 1-	6	SGTRU J2 - 6	I
ID 1-	95	DIFFERENTIAL ECL TWIST WITH ID 1+	6	SGTRU J2 - 13	I
COL SYNC+	53	DIFFERENTIAL ECL TWIST WITH COL SYNC-	6	SGTRU J2 - 4	I
COL SYNC-	52	DIFFERENTIAL ECL TWIST WITH COL SYNC+	6	SGTRU J2 - 12	I
DIG VID CLOCK+	18	DIFFERENTIAL ECL, 33MHZ NOMINAL TWIST WITH DIG VID CLOCK-	6	SGTRU J2 - 10	I
DIG VID CLOCK-	17	DIFFERENTIAL ECL, 33MHZ NOMINAL TWIST WITH DIG VID CLOCK+	6	SGTRU J2 - 1	I
DIG VID SHIELD	14			SGTRU J2 - 100	
SCAN RX DATA+	5	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN RX DATA-	1	SGTRU J2 - 62	I
SCAN RX DATA-	11	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN RX DATA+	1	SGTRU J2 - 61	I
SCAN TX DATA+	63	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN TX DATA-	1	SGTRU J2 - 58	O
SCAN TX DATA-	64	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN TX DATA+	1	SGTRU J2 - 57	O
SCAN CLK-	33	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN CLK+	1	SGTRU J2 - 60	I
SCAN CLK+	22	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN CLK-	1	SGTRU J2 - 59	I
SCAN SYNC+	31	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN SYNC-	1	SGTRU J2 - 18	I
SCAN SYNC-	43	DIGITAL VOLTAGE, RS-422 TWIST WITH SCAN SYNC+	1	SGTRU J2 - 17	I
SCAN SHIELD	21			SGTRU J2 - 56	

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J3**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**SOURCE**	**I/O**
FOCUS DISABLE	72	DIGITAL, TTL VOLTAGE LEVELS	7	SGTRU J2 - 64	O
FOCUS STEP	73	DIGITAL, TTL VOLTAGE LEVELS	7	SGTRU J2 - 75	O
FOCUS DIR	74	DIGITAL, TTL VOLTAGE LEVELS	7	SGTRU J2 - 85	O
FOCUS COMMON	47	+5VDC FOCUS COMMON	2	SGTRU J2 - 63	O
FOCUS CMD SHIELD	32			SGTRU J2 - 33	
FOV DRIVE+	85	DC MOTOR, 0 TO +15 VDC TWIST WITH FOV DRIVE-	2	SGTRU J2 - 50	O
FOV DRIVE-	84	DC MOTOR, 0 TO +15 VDC TWIST WITH FOV DRIVE+	2	SGTRU J2 - 49	O
FOV DRIVE SHIELD	48			SGTRU J2 - 42	
FILTER DRIVE+	66	DC MOTOR, 0 TO +14VDC TWIST WITH FILTER DRIVE-	2	SGTRU J2 - 8	O
FILTER DRIVE-	65	DC MOTOR, 0 TO +14VDC TWIST WITH FILTER DRIVE+	2	SGTRU J2 - 16	O
FILTER POT HI	81	ANALOG VOLTAGE, ±10VDC TWIST WITH FILTER POT WIPER AND FILTER POT LO	4	SGTRU J2 - 35	O
FILTER POT WIPER	82	ANALOG VOLTAGE, ±10VDC TWIST WITH FILTER POT HI AND FILTER POT LO	4	SGTRU J2 - 25	O
FILTER POT LO	83	ANALOG VOLTAGE, ±10VDC TWIST WITH FILTER POT WIPER AND FILTER POT HI	4	SGTRU J2 - 46	O
FILTER DRIVE SHIELD	51			SGTRU J2 - 26	
28V COOLER/FAN 1	68	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 1	2	SGTRU J2 - 45	O
28V COOLER/FAN 2	77	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 2	2	SGTRU J2 - 55	O
28V COOLER/FAN RTN 1	56	+28VDC COOLER/FAN RETURN TWIST WITH 28V COOLER/FAN1	2	SGTRU J2 - 65	O
28V COOLER/FAN RTN 2	57	+28VDC COOLER/FAN RETURN TWIST WITH 28V COOLER/FAN2	2	SGTRU J2 - 66	O

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J3**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**SOURCE**	**I/O**
28V COOLER/FAN 3	58	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 3	2	SGTRU J2 - 19	
28V COOLER/FAN 4	39	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 4	2	SGTRU J2 - 20	
28V COOLER/FAN 5	38	+28VDC (+18 TO +32 VDC, 1.7 AMP MAX RMS) TWIST WITH 28V COOLER/FAN RTN 5	2	SGTRU J2 - 44	
28V COOLER/FAN RTN 3	46	+28VDC COOLER/FAN RETURN TWIST WITH 28V COOLER/FAN3	2	SGTRU J2 - 21	
28V COOLER/FAN RTN 4	37	+28VDC COOLER/FAN RETURN TWIST WITH 28V COOLER/FAN4	2	SGTRU J2 - 22	
28V COOLER/FAN RTN 5	27	+28VDC COOLER/FAN RETURN TWIST WITH 28V COOLER/FAN5	2	SGTRU J2 - 23	
28V COOLER SHIELD	67			SGTRU J2 - 34	
SENSOR FAN HALL	40	HALL EFFECT SPEED SENSOR	2	SGTRU J2 - 3	I
SENSOR FAN RTN	41	SWITCHED +28V RETURN TWIST WITH SENSOR FAN HALL	2	SGTRU J2 - 2	I
FAN POWER SHIELD	45			SGTRU J2 - FLOAT	
TRS DRIVE 1+	87	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE 1-	2	SGTRU J2 - 41	O
TRS DRIVE 1-	86	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE 1+	2	SGTRU J2 - 51	O
TRS DRIVE 2+	89	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE 2-	2	SGTRU J2 - 96	O
TRS DRIVE 2-	88	+3 TO -3 VDC 1.2 AMP MAX TWIST WITH TRS DRIVE 2+	2	SGTRU J2 - 97	O
TRS DRIVE SHIELD	61			SGTRU J2 - 47	
FOV NARROW	36	FOV POSITION, TTL	7	SGTRU J2 - 43	O
FOV WIDE	35	FOV POSITION, TTL	7	SGTRU J2 - 52	O
FOV COMMON	49	FOV POSITION, TTL	7	SGTRU J2 - 53	O
CABLE INTERLOCK	50		2	SGTRU J2 - 40	O
EU J3 SPARE 1	69	TWIST WITH EU J3 SPARE 2		SGTRU J2 - 14	
EU J3 SPARE 2	78	TWIST WITH EU J3 SPARE 1		SGTRU J2 - 15	
EU J3 SPARE 3	79	TWIST WITH EU J3 SPARE 4		SGTRU J2 - 24	
EU J3 SPARE 4	80	TWIST WITH EU J3 SPARE 3		SGTRU J2 - 39	

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J3**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**SOURCE**	**I/O**
EU J3 SPARE 5	59	SPARE WIRE		SGTRU J2 - 11	
SPARE	10			NOT USED	
SPARE	15			NOT USED	
SPARE	19			NOT USED	
SPARE	20			NOT USED	
28V COOLER FAN	28	+28 VDC FAN POWER	2	RESERVED	O
28 V COOLER FAN RTN	26	FAN POWER RETURN	2	RESERVED	O
SPARE	29			NOT USED	
SPARE	30			NOT USED	
SPARE	42			NOT USED	
SPARE	60			NOT USED	
SPARE	62			NOT USED	
SPARE	70			NOT USED	
SPARE	71			NOT USED	
D GND	91			RESERVED	
SPARE	97			NOT USED	
SPARE	98			NOT USED	

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J4**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
28VDC	D	+28VDC (+19 TO +33VDC, 13.1 AMP, MAX RMS)	2	RMS#6 UJ1-1	I
28VDC	E	+28VDC (+19 TO +33VDC, 13.1 AMP, MAX RMS)	2	RMS#6 UJ1-1	I
28VDC RTN	A	+28VDC RETURN	2	RMS#6 UJ1-2	I
28VDC RTN	B	+28VDC RETURN	2	RMS#6 UJ1-2	I
28VDC SHIELD	Chass.		2	TBD	
CABLE TEST	C	CABLE INTERLOCK	2	SGCEU J2 - 11	O
CABLE INTERLOCK	F	AUTO SELF TEST RETURN	2	FCEU J12-B	O

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J5**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
BUS A+	B	1553 VOLTAGE LEVELS	1	VEHICLE, 1553 BUS	I/O
BUS A-	A	1553 VOLTAGE LEVELS	1	VEHICLE, 1553 BUS	I/O
SPARE	C			NOT USED	
BUS A SHIELD					

Table II: SGCEU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGCEU CONNECTOR: J6**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
BUS B+	B	1553 VOLTAGE LEVELS	1	VEHICLE, 1553 BUS	I/O
BUS B-	A	1553 VOLTAGE LEVELS	1	VEHICLE, 1553 BUS	I/O
SPARE	C			NOT USED	
BUS B SHIELD					

Table III: SGBICU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGBICU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
NUC CIRCUMVENT+	13	DIGITAL VOLTAGE, TTL, LOW=0	1	SGTRU J1 - 69	I
NUC CIRCUMVENT-	38	DIGITAL VOLTAGE, TTL, LOW=0	1	SGTRU J1 - 70	I
NUC CIRCUMVENT SHIELD	FLT			SGTRU J1 - 74	
RS 170 A+	9	BALANCED RS-170 VIDEO	5	SGCEU J2 - 14	I
RS 170 A-	35	BALANCED RS-170 VIDEO	5	SGCEU J2 - 23	I
		75 Ω TWINAX WIRE			
RS 170 A SHIELD	36			SGCEU J2 - 10	I
RS 170 D+	6	BALANCED RS-170 VIDEO	5	SGCEU J2 - 5	I
RS 170 D-	5	BALANCED RS-170 VIDEO	5	SGCEU J2 - 4	I
RS 170 D SHIELD	33	75 Ω TWINAX WIRE		SGCEU J2 - 15	I
A KIT TX DATA+	60	DIGITAL VOLTAGE, RS-422	1	SGCEU J2 - 8	I
		TWIST WITH A KIT TX DATA-			
A KIT TX DATA-	15	DIGITAL VOLTAGE, RS-422	1	SGCEU J2 - 17	I
		TWIST WITH A KIT TX DATA+			
A KIT RX DATA+	74	DIGITAL VOLTAGE, RS-422	1	SGCEU J2 - 1	O
		TWIST WITH A KIT RX DATA-			
A KIT RX DATA-	16	DIGITAL VOLTAGE, RS-422	1	SGCEU J2 - 9	O
		TWIST WITH A KIT RX DATA+			
A KIT SERIAL SHIELD	FLT			SGCEU J2 - 30	
P5J	28	+ 5.1 VDC, I=0.74 A max	2	SGCEU J2 - 24	
		Vmax=5.75 VDC, Vmin=4.70 VDC			
		Line Impedance @ 75°C			
		= Reu + Rcables + Ricu			
		Reu = 0.04 ohms max			
		Rcables = 0.20 ohms max			
		Ricu = 0.03 ohms max			
P5J RTN	1	+5.1 VDC Return	2	SGCEU J2 - 61	
		TWISTED PAIR with P5J			
		Reu = 0.04 ohms max			
		Rcables = 0.20 ohms max			
		Ricu = 0.03 ohms max			
P5J SHIELD	FLT			SGCEU J2 - 84	

Table III: SGBICU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGBICU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
P15D 1	7	+15.1 VDC, I = 1.75 A max TWIST P&N15D1 with 15D RTN 1 TWIST P&N15D2 with 15D RTN2 Vmax=16.17 VDC,Vmin=14.25 VDC	2	SGCEU J2 - 99	I
P15D 2	34	Line Impedance @ 75°C (1&2) Reu + Rcables + Ricu Reu = 0.04 ohms max Rcables = 0.20 ohms max Ricu = 0.03 ohms max	2	SGCEU J2 - 100	I
N15D 1	4	-15.1 VDC, I = 1.34 A max TWIST P&N15D1 with 15D RTN 1 TWIST P&N15D2 with 15D RTN 2 Vmax=15.91 VDC,Vmin=14.40 VDC	2	SGCEU J2 - 87	I
N15D 2	32	Line Impedance @ 75°C (1&2) Reu + Rcables + Ricu Reu = 0.04 ohms max Rcables = 0.20 ohms max Ricu = 0.03 ohms max	2	SGCEU J2 - 94	I
15D RTN 1	31	15VDC Return (ground) TWIST 15D RTN 1 with P&N15D1 TWIST 15D RTN 2 with P&N15D2	2	SGCEU J2 - 42	I
15D RTN 2	2	Line Impedance @ 75°C (1&2) Reu + Rcables + Ricu Reu = 0.04 ohms max Rcables = 0.20 ohms max Ricu = 0.03 ohms max	2	SGCEU J2 - 71	I
15D SHIELD	FLT			SGCEU J2 - 82	

Table III: SGBICU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGBICU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
70 VDC	8	+ 70 VDC, I=0.062 A max Vmax=73.1 V, Vmin=67.1 V Line Impedance @ 75°C = Reu+Rcables+Ricu Reu=0.17 ohms max Rcables=0.326 ohms max Ricu=0.05 ohms max	2	SGCEU J2 - 34	I
70 VDC RTN	30	+ 70 VDC Return (ground) TWISTED PAIR with 70 VDC Reu=0.17 ohms max Rcables=0.326 ohms max Ricu=0.05 ohms max	2	SGCEU J2 - 31	I
70 VDC SHIELD	FLT		2	SGCEU J2 - 29	
CABLE INTERLOCK	73	24 VDC RETURN	2	SGTRU J1 - 62	O
AUTO SELF TEST	41	5 V LOGIC HI INDICATES FAILURE OR CABLE DISCONNECTED	2	FCEU J12-C	O
SEARCH STARE 0	61	SEARCH/STARE SWITCH	2	SGTRU J1 - 45	I
SEARCH STARE 1	17	SEARCH/STARE SWITCH	2	SGTRU J1 - 46	I
SEARCH STARE 2	44	SEARCH/STARE SWITCH	2	SGTRU J1 - 47	I
UP	62	BORESIGHT SWITCH	2	SGTRU J1 - 55	I
DOWN	42	BORESIGHT SWITCH	2	SGTRU J1 - 56	I
LEFT	63	BORESIGHT SWITCH	2	SGTRU J1 - 9	I
RIGHT	26	BORESIGHT SWITCH	2	SGTRU J1 - 35	I
FILTER 0	49	ANTI-GLARE SWITCH	2	SGTRU J1 - 76	I
FILTER 1	20	ANTI-GLARE SWITCH	2	SGTRU J1 - 64	I
FILTER 2	43	ANTI-GLARE SWITCH	2	SGTRU J1 - 66	I
BIT	18	BIT COMMAND MODE	2	SGTRU J1 - 51	I
BORESIGHT	19	BORESIGHT COMMAND	2	SGTRU J1 - 58	I
SWITCH COMMON	52	DC RETURN	2	SGTRU J1 - 44	I
LAMP POWER	14	LAMP POWER	2	SGTRU J1 - 10	I
TRU RDY	40	24 V LAMP CONTROL	2	SGTRU J1 - 57	O
LAMP TEST	11	Switched 24 VDC RTN to Test Lamps on TIS Panels	2	TBD	I
LAMP POWER RTN	39	24 VDC RTN	2	RSM6 UJ1-3	I

Table III: SGBICU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGBICU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
AZIMUTH OFFSET DATA	65	RETICLE OFFSET DATA+ 1 MHZ DATA SYNCHRONOUS WITH OFFSET CLOCK TWIST WITH OFFSET DATA INV	2	FCEU J12-W	I
AZIMUTH OFFSET DATA INV	24	RETICLE OFFSET DATA- 1 MHZ DATA SYNCHRONOUS WITH OFFSET CLOCK TWIST WITH OFFSET DATA	2	FCEU J12-s	I
AZIMUTH OFFSET CLOCK	25	RETICLE OFFSET CLOCK+ 1 MHZ OFFSET CLOCK TWIST WITH OFFSET CLOCK INV	2	FCEU J12-X	I
AZIMUTH OFFSET CLOCK INV	48	RETICLE OFFSET CLOCK- 1 MHZ OFFSET CLOCK RTN TWIST WITH OFFSET CLOCK	2	FCEU J12-Y	I
OFFSET SHIELD	FLT		2	VEHICLE CHASSIS	I
RANGE DATA	22	RANGE DATA+ 1 MHZ DATA SYNCHRONOUS WITH RANGE CLOCK TWIST WITH RANGE DATA INV	2	FCEU J12-Z	I
RANGE DATA INV	75	RANGE DATA- 1 MHZ DATA SYNCHRONOUS WITH RANGE CLOCK TWIST WITH RANGE DATA	2	FCEU J12-u	I
RANGE DATA CLOCK	47	RANGE CLOCK+ 1 MHZ RANGE CLOCK TWIST WITH RANGE CLOCK INV	2	FCEU J12-a	I
RANGE DATA CLOCK INV	23	RANGE CLOCK- 1 MHZ RANGE CLOCK TWIST WITH RANGE CLOCK	2	FCEU J12-b	I
RANGE SHIELD	FLT		2	VEHICLE CHASSIS	I
GRC DATA	57	NOT USED		RESERVED	I
GRC DATA RTN	58	NOT USED		RESERVED	I
READY TO FIRE	45	SYMBOLOGY DISCRETE	4	FCEU J12-x	I
MALFUNCTION	27	SYMBOLOGY DISCRETE	4	FCEU J12-e	I
MULTIPLE RETURNS	21	SYMBOLOGY DISCRETE	4	FCEU J12-d	I
SIGNAL_RTN	77	DC RTN	2	FCEU J12-D	I

Table III: SGBICU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGBICU CONNECTOR: J1**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
DAY/NIGHT SWITCH	46	SWITCHED 24VDC FROM GPS Day = +24VDC Night = Open	4	GPS J3-F	I
DAY/NIGHT SWITCH RTN	64	24 VDC RETURN	4	GPS J3-G	I
CRYO_EN	3	Switched 28 VDC RTN to enable B-KIT Cryo Power	2	SGTRU J1-72	O
CRYO_EN_RTN	54	28 VDC RTN	2	SGTRU J1-61	O
AKIT_EN	78	Switched 28 VDC RTN to enable AUX Power Supply	2	SGCEU J2-81	I
AKIT_EN_RTN	79	28 VDC RTN	2	SGCEU J2-80	I
EU J2 SPARE 3	76	SPARE WIRE		SGCEU J2 - 75	
EU J2 SPARE 1	37	TWIST WITH J2 SPARE 5		SGCEU J2 - 74	
EU J2 SPARE 5	51	TWIST WITH J2 SPARE 1		SGCEU J2 - 73	
CHASSIS GROUND	10			RESERVED	
TEST BIT INV	29			RESERVED	
+ 5VDC	50			RESERVED	
+ 70 VDC	56			RESERVED	
24 VDC RETURN	59			RESERVED	
SPARE 6	53			RESERVED	
SPARE 7	66			RESERVED	
SPARE 10	12			RESERVED	
SPARE	55			NOT USED	
SPARE	67			NOT USED	
SPARE	68			NOT USED	
SPARE	69			NOT USED	
SPARE	70			NOT USED	
SPARE	71			NOT USED	
SPARE	72			NOT USED	

Table III: SGBICU Electrical Connections And Signal Types					
CABLE:	**CABLE CONNECTOR:**		**SGBICU CONNECTOR: J2**		
COMMON SIGNAL DESCRIPTION					
NAME	**PIN NO.**	**SIGNAL AND INTERFACE CHARACTERISTICS**	**EMI CODE**	**TO UNIT/CONN & PIN**	**I/O**
G1-M	X	Monocular Bias/Composite Blanking, (G1)	4	TEST	O
BLANK-M	N	Monocular Blanking	4	TEST	O
LOS-M	e	Loss of Monocular Sweep	4	TEST	O
G2-B-CLAMP	f	Biocular G2 Clamp	4	TEST	O
HFB-M	Y	Scaled Monocular Horizontal Flyback	4	TEST	O
VI-M	i	Monocular Vertical Deflection Current	4	TEST	O
M-VID-OUT	B	Monocular Video Out	4	TEST	O
M-VIDEO-K	A	Monocular CRT Cathode Video	4	TEST	O
G2-M-CLAMP	L	Monocular G2 Clamp	4	TEST	O
HVDRV	E	High Voltage Horizontal Rate Drive	4	TEST	O
HDRV	K	Horizontal Drive Pulse	4	TEST	O
BRIT	M	Brightness Control Voltage, (RS-422 DAC)	4	TEST	O
CONT	D	Contrast Control Voltage, (RS-422 DAC)	4	TEST	O
VP	G	Video Present Logic	4	TEST	O
LOV	R	Loss of Voltage Indicator	4	TEST	O
LOV*VP	d	Loss of Voltage or Loss of Video	4	TEST	O
VDRV*VP	c	Vertical Deflection Drive	4	TEST	O
BIOC-OFF	P	Biocular Display OFF Command	4	TEST	O
HFB-B	H	Scaled Biocular Horizontal Flyback	4	TEST	O
VI-B	V	Biocular Vertical Deflection Current	4	TEST	O
BLANK-B	g	Biocular Blanking	4	TEST	O
CATH-B	j	Biocular Bias/Composite Blanking, (Cathode)	4	TEST	O
B-VID-OUT	Z	Biocular Video Out	4	TEST	O
+50 VR	C	DC Voltage	4	TEST	O
B-VID-G1	W	Biocular CRT G1 Video	4	TEST	O
DCRTN	a	Signal Ground	4	TEST	O
LOS-B	T	Biocular Loss of Sweep	4	TEST	O
VCO-TP	b	Control Voltage to VCO in Phase Lock Loop	4	TEST	O
HVSENSE	U	Scaled +2750 VDC from HVPS	4	TEST	O
+10 R	J	Internal +10 Volt Reference	4	TEST	O